

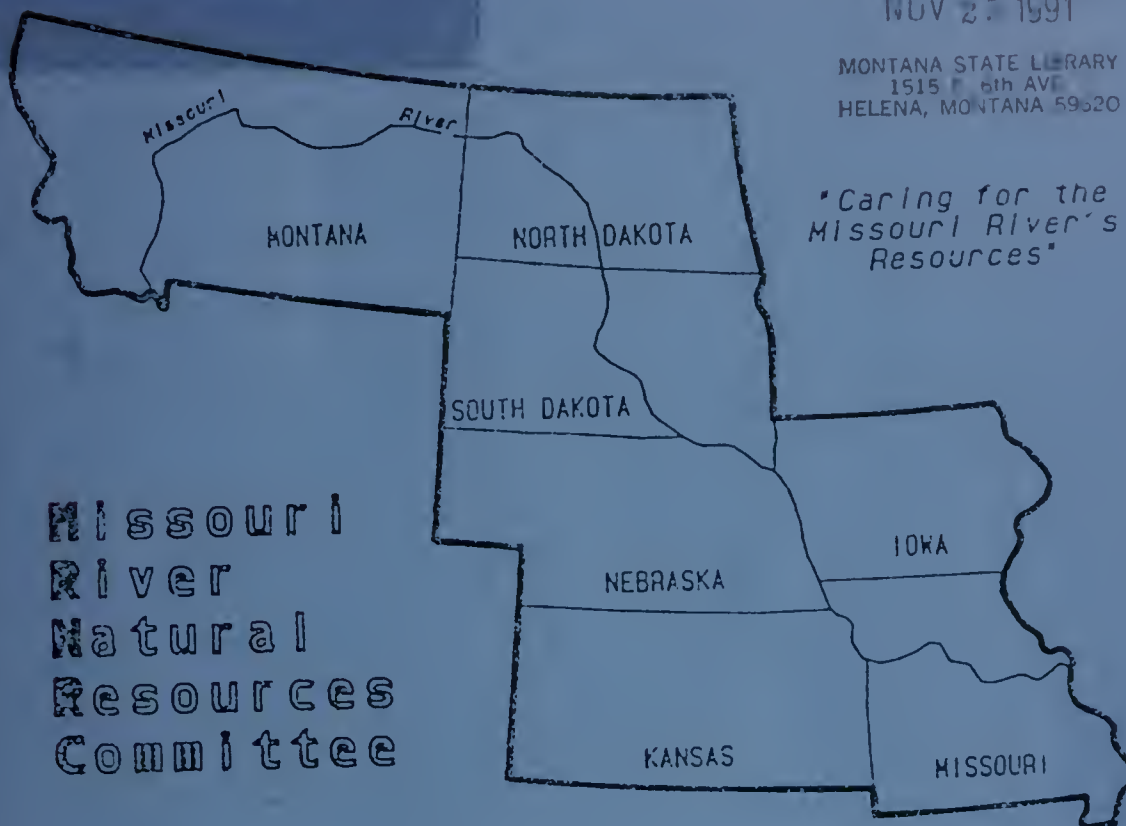
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333.91 Missouri River
M26apmr Natural Resources
1988 Committee, Meeting
Annual
proceedings of the
Missouri River
Natural Resources

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SECOND ANNUAL PROCEEDINGS
OF THE
MISSOURI RIVER
NATURAL RESOURCES COMMITTEE
1988

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Table of Contents

	<u>Page</u>
1988 Officers of the MRNRC	1
Past Meetings	2
1988 MRNRC Membership	3
Proceedings of the Business Meetings	5
First	5
Second	24
Presentation by Coordinator at Water Control Meeting	31
Recommendations for River Operation	42
Statement by Chairman	92
Statement by Coordinator	93
Constitution and Bylaws	94

Officers
of the
Missouri River Natural Resources Committee

Elected at
Second Annual Meeting

to Serve During
1988

Chairman: Larry Peterman
Montana Department of Fish, Wildlife and Parks
1420 East Sixth Avenue
Helena, Montana 59620

Chairman-Elect: Ken Brunson
Kansas Wildlife and Parks
Box 54A, Route 2
Pratt, Kansas 67124

PLACE, DATE, AND OFFICERS OF PAST MEETINGS

Place	Date	Chairman	Chairman-Elect	Coordinator
Omaha, NE	Mar. 24, 1987	Tom Gengerke	Larry Peterman	Kent Keenlyne
Milwaukee, WI	Dec. 7, 1987	Tom Gengerke	Larry Peterman	Kent Keenlyne
Bismarck, ND	Mar. 22, 1988	Larry Peterman	Ken Brunson	Kent Keenlyne
Helena, MT	Aug. 29-31, 1988	Larry Peterman	Ken Brunson	Kent Keenlyne

DELEGATES

State Representatives

Larry Peterman
Montana Department of Fish, Wildlife and Parks
1420 East Sixth Avenue
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James Ragan
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Dennis Unkenholz
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Jefferson City, Missouri 65102-0180

John W. (Jack) Robinson
Missouri Department of Conservation
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USFWS Representatives

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Valentine, Nebraska 69201

Frank Pfeifer
Valley City National Fish Hatchery
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Missouri River Division
P.O. Box 103, Downtown Station
Omaha, Nebraska 68101-0103

Duane Sveum
Corps of Engineers
Reservoir Control Center
P.O. Box 103, Downtown Station
Omaha, Nebraska 68101-0103



Meeting Minutes - March 22, 1988

Bismarck, North Dakota

The spring 1988 Missouri River operations coordination meeting between the Missouri River Natural Resources Committee and the Corps of Engineers was held on March 22, 1988, in Bismarck, North Dakota. The North Dakota Game and Fish Department hosted the meeting at their offices, 100 North Bismarck Expressway, Bismarck. A list of attendees is attached.

Chet Worm advised the group that last year (1987) flows were only 62 percent of normal above Fort Peck and 58 percent of normal above Garrison. As of March 15, snow pack above Garrison was 84 percent of normal. In order to provide full service, the Corps likes to have a carryover of 58.5 million acre-feet (MAF) in the system and are presently 4 MAF below the "normal" carryover. The North Platte was running 119 percent of normal but would not present a problem. The navigation season was to begin March 23 at Sioux City.

Dave Wooster was introduced as the person that now fills the spot vacated by George Patenode who had retired. Wooster had some handouts on projections along with upper and lower quartile estimates for higher and lower flows.

Bill Wiedenheft represented Montana and provided the attached report from his state. Montana would like Fort Peck to reach elevation 2240 this year.

Emil Berard represented North Dakota and provided the attached notes. He pointed out the purpose of the drawdowns is to both establish vegetation for later spawning needs and as a means of cleansing the substrate for spawning. The desire was to bring Garrison up in 1989 into the planned two-year regime and maximize lake levels in 1990 (timed to meet fish spawning needs).

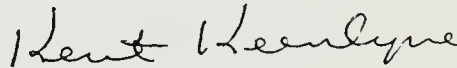
Dennis Unkenholz represented South Dakota and provided their attached recommendations. He explained that what is attempted by the recommendations is to capitalize on normal cycles but observed that we have not been very successful in doing this artificially, as yet. He observed that the 1987 water levels came late to be utilized by the target species and that there is a problem meeting high water needs because Garrison fills out of the Yellowstone River which is the last to send its snow melt. He also observed that present attempts to get a hatch at least once in three years may not be as beneficial as twice in four years with partial use of the vegetation in interim years. Unkenholz referred to earlier studies below Fort Randall which developed recommendations of 20,000 cubic feet per second (cfs). The intent was to put water into the backwater which may not now happen at that flow level considering the degradation that has occurred in that reach since the earlier studies. Additional work is needed to update flow

recommendations and water levels. Bob Hanten asked whether wetland habitat could be built in spillways like Oahe. Dick Taylor said he would check it out.

Gene Zuerlein represented Nebraska. He also indicated that the overall scheme was to attempt to represent more "natural" flows that the various species had developed under. An example of the paddlefish was cited where an increase in flows and a "rise" were needed to trigger spawning activity. Zuerlein observed that the Missouri River draws many people and is a significant resource, both naturally and economically.

Dave Wooster handed out a package on a proposed outage at Fort Peck to replace penstocks. Work is proposed, along with a drawdown, in 1989 and 1990.

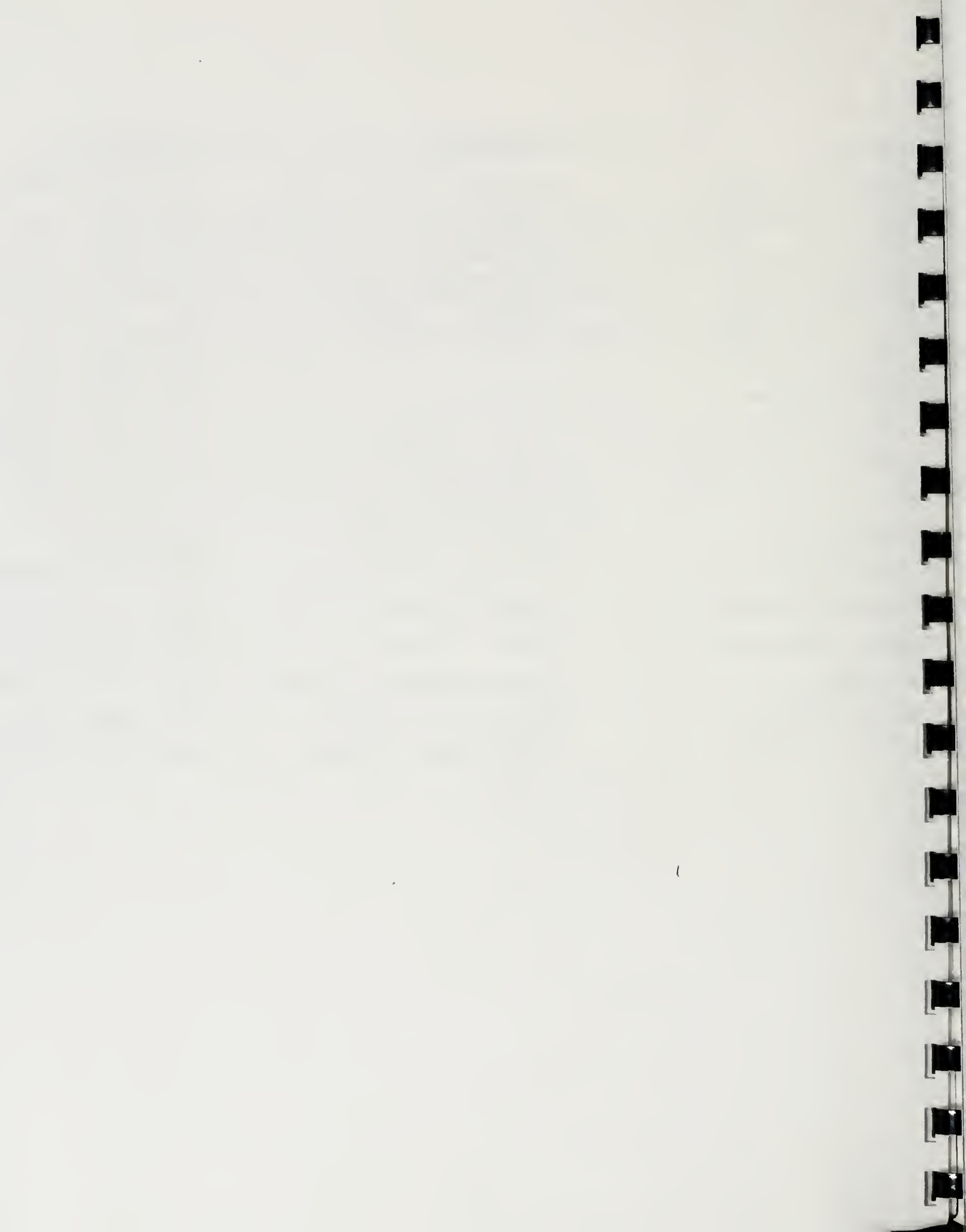
Respectfully submitted,

A handwritten signature in cursive script that reads "Kent Keenlyne".

Kent Keenlyne
Coordinator

Attachments

<u>Name</u>	<u>Agency</u>	<u>Phone #</u>
Kent Keenlyne	MRNRC coordinator	605-224-2824
Bill Wiedenheft	MDFWP	406-526-3471
Don Warmick	SD GF&P	605-773-5535
Dick Taylor	Mo. R. Div. COE	402-221-7279
DON DUNWOODY	COE - MRD	402-221-7284
Duane Sycum	" "	402-221-7347
Chet Worm	" "	402-221-7354
Dave Wooster	COE - MRD	402-221-7350
Mark C. Harberg	COE - MROPO - M	402 221 4885
Pandy Kreil	ND GAME - Fish Dept.	701-224-9876
Eileen Dawd	SD Game, Fish & Parks	605-773-4229
Bob Hanton	SD GF&P Pierre	605-773-3384
Dennis UNKENHOLZ	SDGFP PIERRE	605-773-5535
MARY MARRONE	SDGFP PIERRE	605-773-5535
Tim Bernard	ND Game & Fish Dept, Bismarck	701-654-7475
JAMES RAGAN	ND GAME & FISH DEPT.	701-221-6300
GENE ZUERLEIN	NEPA. GAME - PARKS	402/464-0641



WATER LEVEL OPERATING PLAN FOR FORT PECK RESERVOIR
(LONG RANGE PLAN)

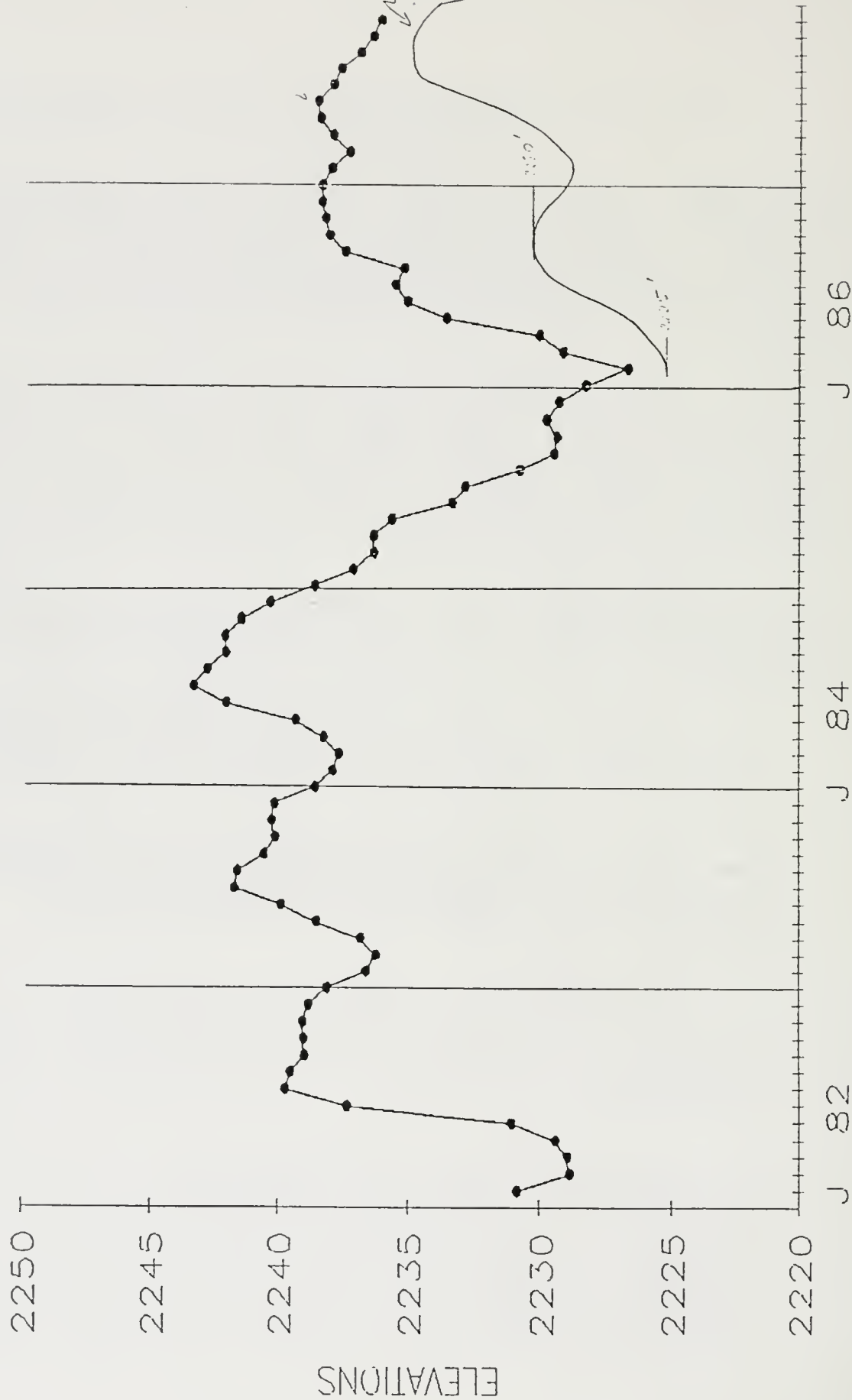
Fort Peck reservoir, like most large impoundments, is multipurpose and is currently managed to provide water for hydroelectric power, irrigation, downstream navigation and flood control. Another use, which currently seems to have been overlooked, is recreation. It is believed that with proper water level management the overall productivity of the fishery can be enhanced.

Reservoirs that fluctuate as Fort Peck, have littoral zones which are very unstable. This results in loss of vascular aquatic and terrestrial plants and the associated populations of phytoplankton and benthic organisms. Lack of submerged vegetation causes a decline in the overall productivity of the entire fish population by reducing food supply, spawning substrate, and cover for forage fish, as well as rearing area for other fish species.

If a suitable water level management plan is implemented, shoreline vegetation can be encouraged to grow, and productivity of the littoral zone can be improved. The following plan is submitted as a method to accomplish this goal:

1. Maximum pool should be established at 2240' msl. If, during a year of high runoff, the flood pool at 2246' is attained, then an area of vegetation will have been established just above 2240'.
2. Several years of water levels being operated in the same static range is to be avoided. If this situation occurs, it is recommended that the summer peak be eliminated every third year to promote growth of shoreline vegetation.
3. In drought years the pool should be dropped to 2225', or lower and gradually raised in 5-foot annual increments to preserve vegetation established at higher levels for future years. The raise should be terminated when maximum pool, or an elevation of 2240' is attained.
4. To accommodate spring spawning fish, it is recommended the water level rise as soon as possible (May). We realize that in some years natural mountain runoff does not occur at this time; however, water releases could be reduced in spring to facilitate flooding of shoreline vegetation at the earliest date possible. If this cannot be achieved, we recommend that the level be brought up at least by late June, or early July, to provide cover and rearing area for young-of-year fish.

MAXIMUM WATER ELEVATIONS FORT PECK RESERVOIR



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J 85

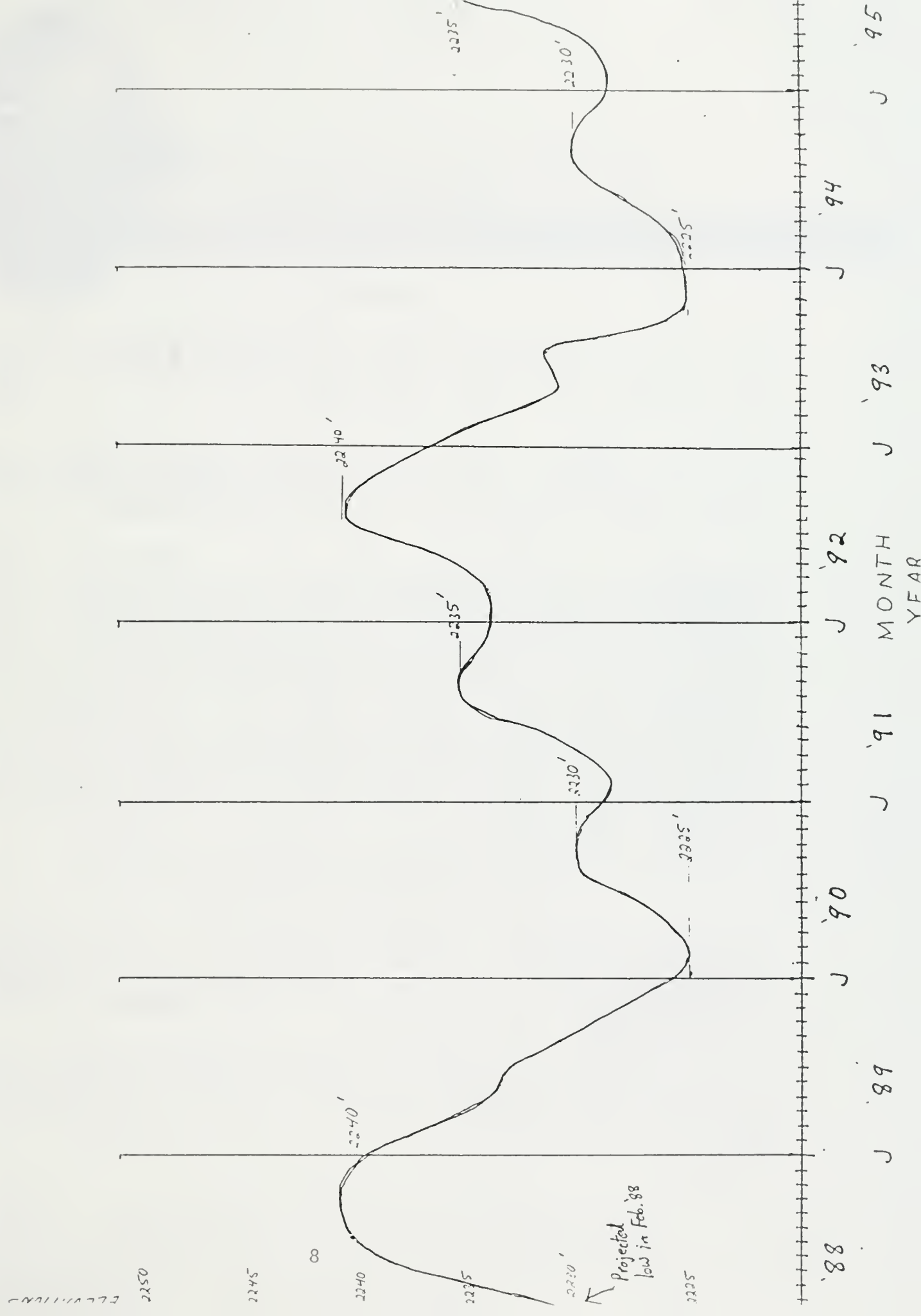
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MONTH
YEAR

ELEVATIONS



1988 WATER LEVEL AND DISCHARGE RECOMMENDATIONS FORT PECK RESERVOIR

RESERVOIR

The present mountain snowpack in the Missouri River Drainage above Fort Peck Reservoir is approximately 70 percent of normal, and snowpack in the surrounding lowlands is virtually nonexistent. The outlook for normal spring and early summer flows into the Reservoir, looks very poor.

The COE, February Inflow Forecast, predicts a maximum lake elevation of 2236.9' in late July, 1988. This will not provide a water level sufficient to inundate shoreline vegetation established above last year's peak elevation of 2238.5'.

Although it is apparent that 1988 spring inflow will not be adequate to raise the Fort Peck pool to the elevation of 2240', as recommended in the Long Range Water Level Operating Plan, (see attachment), it is suggested that the COE attempt to reduce inflow into Lake Sakakawea. These discharges should not be reduced below minimum flows recommended for the fishery immediately below Fort Peck, (see below), but should be diminished sufficiently to help fulfill water levels requested by the North Dakota Game and Fish Department. Ultimately, it is hoped that this strategy will not only satisfy recommendations to enhance the fishery in Lake Sakakawea, but will also provide consistency for long range water level management strategies for the entire upper Missouri River System, thereby benefitting the Fort Peck fishery as well.

MISSOURI RIVER, BELOW DAM

A minimum instantaneous discharge of 7,800 cfs, should be maintained from April 1 through September 30, to provide optimum spawning and rearing habitat for rainbow trout. The absolute minimum discharge necessary to sustain recruitment is 4,500 cfs. After September 30, a minimum instantaneous discharge should be maintained at, or above, 2,700 cfs.

If a conflict arises between meeting the desired discharges below the dam, or the recommended reservoir elevation; the reservoir should receive priority. During most years, it is assumed that both needs can be met.



" VARIETY IN HUNTING AND FISHING "

NORTH DAKOTA GAME AND FISH DEPARTMENT

100 NORTH BISMARCK EXPRESSWAY

BISMARCK, NORTH DAKOTA 58501-5095

PHONE 701-221-6300

Riverdale, ND 58565
February 12, 1988

Mr. Kent D. Keenlyne
Fish and Wildlife Service
P.O. Box 986
Pierre, SD 57501

Dear Kent:

Enclosed are our generic recommendations for Lake Sakakawea and Lake Oahe (1988-1994). The basic request is an attempt to adhere to an unbalanced mode of operation while trying to incorporate the anticipated construction at Fort Peck in 1990, and recharging of the system in 1991-1992.

Additional goal priorities for North Dakota would include:
1) further address control of pollution sources into the system;
2) research and develop established vegetation in back-bay littoral zones; 3) complete a base line genetic inventory of key sport species; 4) research and continued stocking of forage species (i.e. crayfish at dam sites for smallmouth bass); 5) curtail oil development on or near impoundments. Important development goals should include: 1) siltation sub-impoundments and rip-rap protection of key recreational areas.

If you have any questions, please feel free to call.

Sincerely,

Emil Berard
District Fisheries Manager

EB:skt

Enclosure



Dale L. Henegar
COMMISSIONER

Charles H. Schroeder
DEPUTY COMMISSIONER

NORTH DAKOTA

GENERIC MISSOURI RIVER RESERVOIR WATER LEVEL RECOMMENDATIONS

Historically, extreme changes in water levels produced the most positive impacts to the Missouri River fishery in North Dakota. Excellent overall recruitment in both reservoirs for the years 1975, 1978, 1982 and 1986 resulted from a cycle of events which temporarily altered substrate and cover types for subsequent inundation. A systematic approach to duplicate those cycles is the basic goal for operating the upper three Missouri Mainstem Reservoirs in an unbalanced mode.

Lake Sakakawea

Recent water level recommendations for Lake Sakakawea have followed a basic pattern to maximize the utilization of walleye spawning substrate. This approach, based on the need to produce a strong walleye year class, has been relatively unsuccessful. Suitable inundated spawning substrate is only one of many essential parameters needed for successful fish recruitment.

Strong recruitment has generally followed a two year drought cycle, or water levels in a given year exceeded the previous year's high water mark by four to six feet. Overall recruitment during the drought or drawdown years is generally low because spring water levels inundate less suitable spawning substrate and summer water levels can't provide the essential elements associated with inundated vegetation. Drought cycles help to improve spawning substrate, while providing an opportunity to reestablish vegetation in what will be the littoral zone during high water years.

A brief review of the fishery results associated with various water level cycles might help to explain these points. Between 1970 and 1973, yearly water level patterns were very similar. Water levels fluctuated from a low near 1837 feet msl in 1970 to a high of 1849.5 in 1973. Fishery production during this period was very unstable for a number of reasons: adverse weather conditions, draw downs during spawning-incubation (1971-72), lack of inundated vegetation, and instability in the spawning substrate. This was a period when typical northern pike spawning substrate was physically being transformed into walleye spawning substrate. The silt load was high, and shifted readily with changing wind directions. In 1974, water levels again approached 1838 feet msl for the first time in three years. Displacement of the silt load to a lower elevation (improving spawning substrate) coupled with mild weather conditions and rapidly rising water levels produced our first strong overall year class with the reservoir operated at full pool (Figure I).

Water levels in 1975 ranged from a low near 1838 feet msl to a record high of 1854.8. Further improvements to spawning substrate, a rapid spring water level rise to inundate substrate and buffer eggs during incubation, and five feet (vertical elevation) of newly flooded vegetation combined to produce the strongest fish recruitment on record.

Fish production dropped sharply in 1976. Spring water levels inundated substrate that had been degraded by high water erosion the previous year. The pool rise came late in the season, and peaked (1849 feet msl) in the absence of terrestrial vegetation. Fish production remained low as water levels continued to decline in 1977 (peak 1838 feet msl). During this drought cycle, water levels dropped to a low of 1828 feet msl in February of 1978. Declining water levels again displaced the silt load to lower elevations. This expanded and/or improved the zone of desirable spawning substrate, and provided a period for shoreline revegetation.

An early, strong rise in water levels produced excellent fish recruitment in 1978 (walleye production set an all time high) (Table 1). A number of essential parameters were addressed: early inundation of quality spawning substrate, rapidly rising water levels to buffer wind and/or temperature changes during egg incubation, and flooding of more than ten vertical feet of one and two year old vegetation which improved basic productivity and survival.

The cycle continued with declining water levels in 1979 (peak 1846 feet msl), 1980 (peak 1840 feet msl), and 1981 (peak 1836 feet msl). Fish production fluctuated based on extremes in the previously described parameters. Overall recruitment improved again in 1982 (second highest year on record for walleye production) as water levels rose sharply to inundate four vertical feet of one year old vegetation and six vertical feet of two year old vegetation. All of the basic elements representing the strong recruitment in 1978 were achieved.

Fish production in 1983 and 1984, although average years for overall recruitment, was disappointing in light of existing reservoir conditions. In 1983, water levels inundated prime walleye spawning substrate, but continued to decline throughout the early spawning season. Peak elevations inundated a limited amount of terrestrial vegetation providing some relief for later spawning species. Prime walleye spawning substrate was again inundated in 1984 and water levels rose slightly, but a late snow storm resulted in the poorest walleye recruitment on record. Peak summer elevations inundated approximately three vertical feet of well established terrestrial vegetation which was again utilized successfully by later spawning species. Water levels declined sharply in 1985 (peak 1841.5 feet msl), resulting in the lowest overall fish recruitment on record.

The excellent overall recruitment experienced in 1986 was somewhat surprising. Spring water levels inundated a minimum amount of prime spawning substrate, but then rose sharply peaking at 1848.7 feet msl. The rise occurred too late to benefit early spawners, but the high water levels did inundate approximately six vertical feet of one year old vegetation which was used effectively by later spawning species. These results placed new value on the potential of short term cycles for improving the fishery. Declining water levels in 1987 (peak 1843.6 feet msl) were again paralleled by below average fish production.

This overly simplistic review outlines some basic considerations which must be addressed in the generic or long range water level management recommendations (Unbalanced Operational Mode).

1. Maximum water level extremes (1838-1850 feet msl) must be established to develop a window within which annual recommendations can remain flexible and productive. A maximum elevation of 1838 is recommended for 1988 (Figure II) to improve spawning substrate below this elevation while developing a one year vegetation zone to 1844 and two year vegetation zone above that point. This would also help facilitate the filling of Fort Peck as recommended. Any peak elevation between 1834 and 1838 feet msl is also acceptable for 1988. Water level increases recommended for 1989 and 1990 are designed to maximize the utilization of spawning substrate and established vegetation while reflecting on recommended drawdowns for Fort Peck (anticipated construction in 1990). Recommendations beyond 1990 repeat a drawdown cycle for Lake Sakakawea while recharging the system following construction at Fort Peck.
2. The spring water level rise must inundate good spawning substrate by April 15th, and continue to rise sharply during spawning-incubation (April-May). This provides the buffer needed by early spawners. A target increase of three feet between April 15th and May 15th would ensure this goal during the filling cycle (1989-1990, Figure II).
3. Utilization of inundated terrestrial vegetation should be maximized. A target to inundate a minimum of three vertical feet of two year old vegetation should be attempted when possible. The example presented in Figure II, 1989, includes three vertical feet of two year old vegetation above the high water level in 1987, and preserves three additional vertical feet of well established vegetation for 1990. A target to inundate a minimum of six vertical feet of one year old vegetation should be attempted following a short term drawdown. Peaking each year should be short term to protect as much vegetation as possible, and promote regrowth during the drawdown. Planning should also facilitate the scheduled use of hatchery stock.
4. Static or balanced water level management will not produce a desirable fishery (1970-1973). Every attempt should be made to produce a strong year class every third year. This may require alternating long and short term drawdown cycles.
5. Project releases must be anticipated and adjusted early enough to remain uniform for endangered nesting shore birds.

Lake Oahe

The history of water level management on Lake Oahe, and the fishery results produced by that management parallel our experiences for Lake Sakakawea. Our remarks are, however, based on observations in that portion of Lake Oahe which lies within the state of North Dakota. They do not reflect the reservoir fishery as a whole.

Strong fish recruitment in 1975 followed a two year low water cycle where the reservoir elevation remained below 1610 feet msl. The rapid increase in pool levels that year inundated prime spawning substrate as well as six vertical feet of two year old vegetation and two vertical feet of new vegetation (Figure III). Water levels in 1976 and 1977 resembled those experienced in 1973 and 1974. Fish production for these low cycles ranged from average to very poor. Excellent recruitment in 1978 (walleye production set an all time high) resulted as high water levels again inundated seven vertical feet of two year old vegetation. The water levels in 1979 duplicated those for 1978, but produced only an average year class on residual vegetation.

A gradual drawdown began in 1980 (peak 1608 feet msl) and continued through 1981 (peak 1602 feet msl). Peak elevations for these years were reached in April and March respectively, and then declined through November. Limited spawning substrate coupled with declining water levels during spawning and incubation resulted in poor fish recruitment. Overall recruitment was again excellent in 1982 (peak 1613 feet msl) as constantly rising water levels inundated five vertical feet of one year old vegetation and five additional vertical feet of two year old vegetation. Water level peaks increased in 1983 (peak 1616 feet msl) and 1984 (peak 1618 feet msl), but failed to produce expected increases in fish production. A late winter storm is likely responsible for the poor fish recruitment in 1984. It is believed, however, that tributary streams in South Dakota have had a positive influence on recruitment as these year classes of walleye are now being observed as adults in North Dakota. Water levels declined in 1985 (peak 1611 feet msl). Inadequate spawning substrate and declining water levels during spawning and egg incubation resulted in the poorest year class of walleye on record. An early, rapid rise in water levels inundated seven vertical feet of one year old vegetation in 1986 (peak 1618 feet msl). Excellent fish recruitment resulted, and walleye production was second highest on record. The overall production results were similar to Lake Sakakawea which places more value on short term cycles. Fish recruitment declined in 1987 as Lake Oahe began a drawdown cycle.

Generic recommendations for Lake Oahe should address the same basic considerations needed for Lake Sakakawea.

1. Maximum water level extremes (1608-1618 feet msl) must be established to provide a degree of latitude for making annual recommendations. A maximum elevation of 1610 feet msl is requested for 1988 (Figure IV) to complete a two year drawdown cycle for revegetation. Water level recommendations beyond 1988 are based on a cycle which includes Lake Sakakawea and Fort Peck.
2. The spring water level rise must inundate spawning substrate by April 15th and continue to rise through June.
3. A target to inundate a minimum of three vertical feet of two year old vegetation should be attempted when possible. A target to inundate a minimum of four vertical feet of one year old vegetation should be attempted following a short term drawdown. Peaking each year should be short term.

4. Every attempt should be made to produce a strong year class every third year. The potential of drastic short term draw-downs should be explored.

The importance of timely water level manipulation for fish and wildlife resource management can't be overemphasized, nor can the destructive capacity of untimely manipulation be underestimated. Information gained from thirty years of Missouri River investigations now outline the methods and importance of a System Approach to water level management as a tool to enhance fish and wildlife resources. Every attempt should be made to develop workable water level scenarios which will promote those objectives on a more frequent basis. The Unbalanced Operational Mode must be pursued to the fullest if any degree of stability is to be expected from those resources.

Basic generic recommendations as presented place Lake Sakakawea as priority 1, Lake Oahe as priority 2 and Garrison Dam releases as priority 3. Lake Sakakawea has experienced only one strong walleye year class (1982) since 1979. As our ability to revive this fishery through natural reproduction diminishes, the need to capitalize on existing brood stock potential becomes more important. Stocking as a supplement has proven effective in limited areas, but it cannot replace natural reproduction.

Figure I.

LAKE SAK. LEVELS, 1974-1980, 1981-1987 FT. M.S.L.

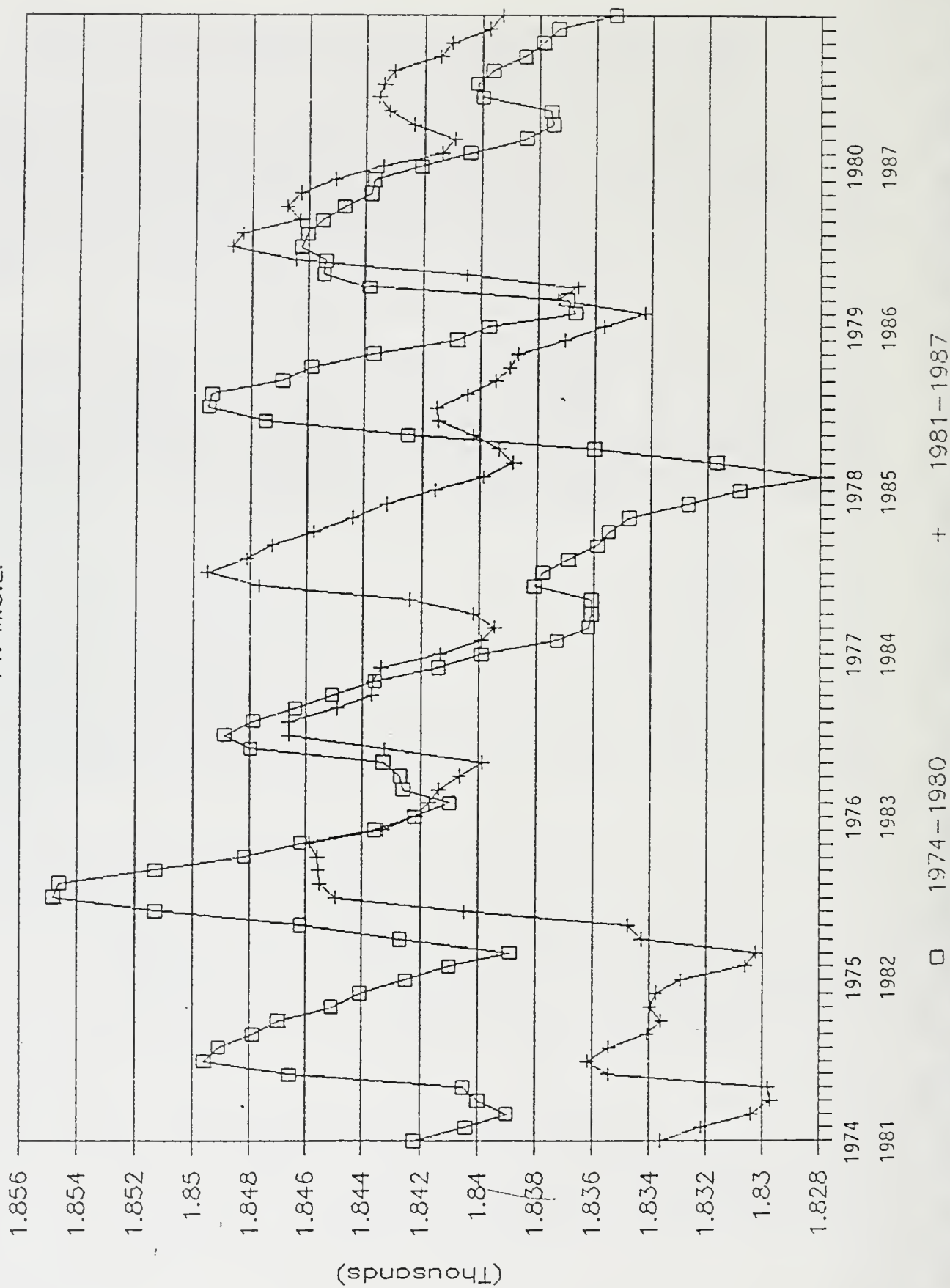
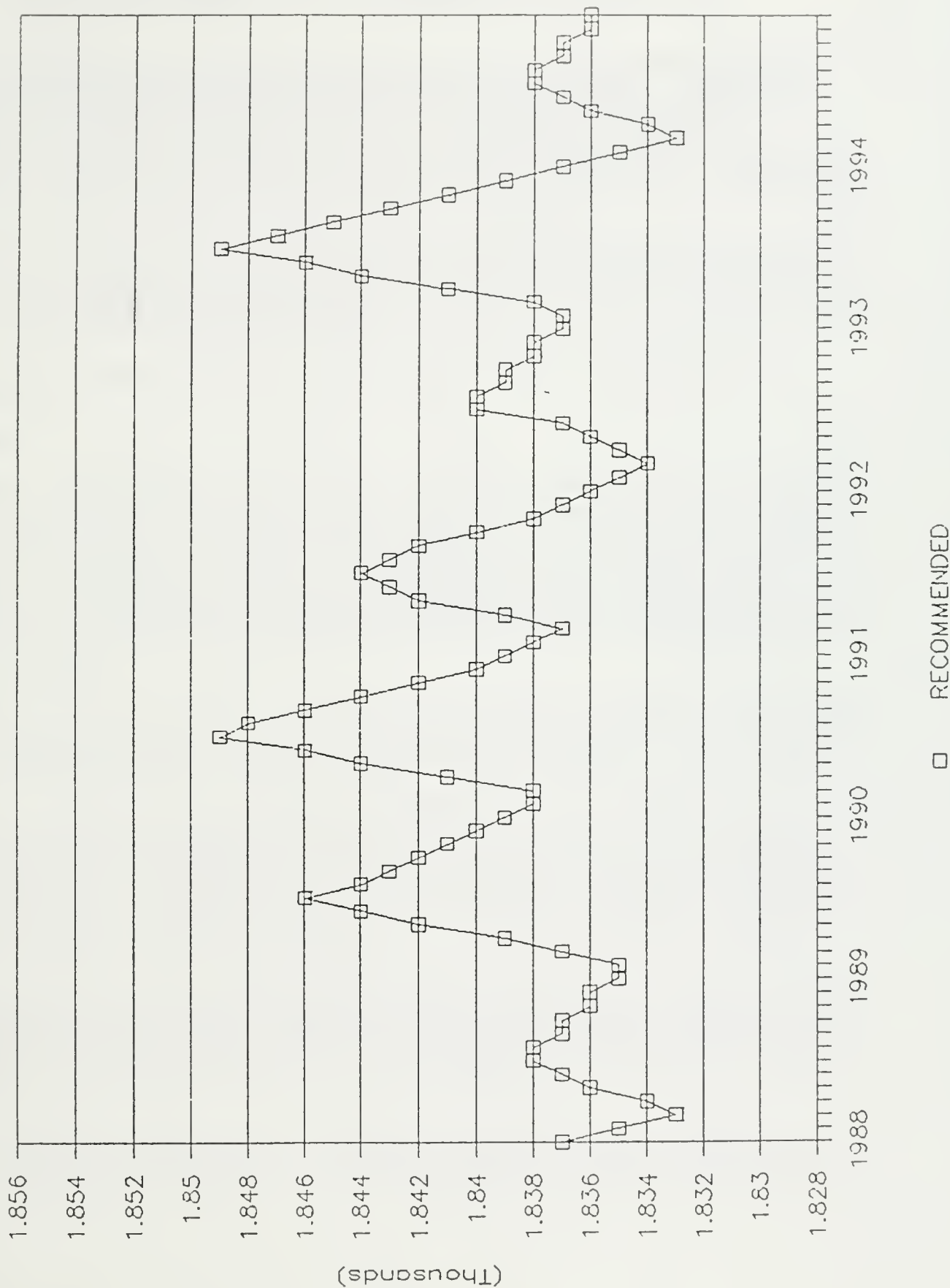


Figure II.

LAKE SAKAKAWEA LEVELS, 1988-1994

FT. M.S.L.





South Dakota Missouri River Generalized Water Management Plan

Missouri River water manipulation is one of the major options available for fisheries, wildlife and recreational management in South Dakota. Information gathered over the years has shown water levels and vegetation regrowth are critical to successful fish reproduction and recruitment on these large reservoirs. Research also indicates that the timing and amount of released water are limiting factors for least tern and piping plover populations. A system-wide approach to water management is supported by South Dakota.

Water level scenarios for each of South Dakota's mainstem reservoirs are somewhat different. General plans are, therefore, presented by reservoir and tailwater reaches. These plans also reflect water level management that is compatible with park use and tern/plover habitat needs.

The following general plans are unique to each respective reservoir and tailwaters:

Lake Oahe

The nature of Oahe Reservoir allows several water management cycles, those being: seasonal, annual, and over several years. A general request over years would allow for a two year period of water levels that do not exceed the base of flood control. This allows a minimum of two growing seasons for shoreline vegetation re-growth. Following the low period, reservoir elevations would be allowed to inundate re-vegetated shoreline in annual increments; thus, utilizing the vegetation over several years rather than all in one year. Fish reproduction and recruitment have been excellent when reservoir elevations follow that general cycle over years.

Annually, water levels should rise from early spring until summer, be held stable for the summer, and then be allowed to decrease gradually during late summer and fall. This scheme should begin with elevation about 1,605 ft in early spring.

Water may be manipulated seasonally by allowing a faster or slower rise in the spring and hold or release water in other reservoirs. This could be used to maximize benefits of shoreline vegetation, water temperatures or the chronology of spawning fish. For example, species could benefit by designing water levels for the appropriate spawning time related to vegetative conditions. Vegetation re-growth could be utilized over more than one spawning season thus benefiting fish production over a series of years.

Sandbars, silt flats and islands exposed on Lake Oahe during the initial years of recommended drawdowns should provide relatively secure nesting habitat for terns and plovers as was evidenced in 1982. The scenario of drawdown, vegetative re-growth, flooding and drawdown will likely benefit terns and plovers as well as northern pike.

Extremes to avoid on Oahe Reservoir would be: elevations below 1600-1602 ft which makes boat ramps unusable; elevations above 1617 ft which causes great amounts of shoreline erosion; and decreasing water levels during spring spawning.

Oahe Tailwaters

Tailwater releases should not drop below 10,000 cfs on weekends during April through September. This would enhance use by the public and stabilize aquatic habitat in the river from the dam to the upper end of Lake Sharpe and potentially prevent ice jams during the winter.

The aquatic habitat is diminished in the river below Oahe Dam when low flows exist. This displaces fish and other aquatic animals and thus impacts the stability of the aquatic community in this valuable river reach.

Stable releases are needed during spring spawning and fishing season. High releases are needed during periods of high turbid flows from the Bad River to flush sediment downstream. Watershed management should be planned in the Bad River drainage to minimize sediment loads from the Bad River.

Any dredging activities in this area should be designed to build artificial nesting structures for terns and plovers. Efforts could be made to concentrate dredge spoils which have been used by both species as nesting habitat in other states.

We need to study the problems associated with winter ice jams and reduced flows from Oahe. The larger question of aggradation should be addressed and the impact that it has had and will have on future flows during all times of the year should be defined. The Pierre/Ft. Pierre study has addressed the question of ice damming from a power production viewpoint. The problem needs to be viewed from a biological/recreational viewpoint as well.

Lake Sharpe

Due to the usual stable operation of Lake Sharpe, the current Corps of Engineers operating plans for that reservoir meet fisheries needs. The sport fishery in Lake Sharpe appears to be the most stable walleye fishery of the four reservoirs because of water management of the reservoir.

Weekend elevation fluctuations greater than 2 feet should be avoided. This affects access at Farm Island and West Bend. Lake elevation should be held greater than 1419.5 ft.

Big Bend Dam Tailwaters

An instantaneous release of 10,000 cfs is needed to stabilize fishing over the weekend and minimize effects of fluctuating water levels on fish. As with the Oahe tailwaters area, any dredging activities could be used to create artificial nesting habitat for terns and plovers. Historic data indicates this area was used during the 1970's by nesting least terns.

Releases of 10,000 cfs or greater are recommended unless make up water from the emergency spillway produces a 10,000 cfs minimum.

Lake Francis Case

Stable to rising water elevations from mid-April to mid-June when fish spawning is mostly complete. Shoreline vegetation is in short supply on Lake Francis Case and two growing seasons are necessary to produce good re-growth that will be useable by spawning fish. Normal fall drawdown severely limits littoral zone production of bottom organisms, which are important fish food items. Any reduction in the amount of fall drawdown would benefit benthic production and in turn provide a boost to the fishery.

Any decrease in water elevation from mid-April through mid-June should be avoided. The relation of reservoir volume to Ft. Randall releases means small changes in inflows or outflows may cause significant elevation changes during prime spawning times. Elevations greater than 1360 ft will cause damage to boat ramps, park facilities, fisheries facilities and increase shoreline erosion. Elevations below 1353 ft during the recreational season of Memorial Day to Labor Day are undesirable. Elevations less than 1345 ft makes most boat ramps unusable.

Fort Randall Tailwaters

The traditional request for stable releases of 20,000 cfs were requested for Fort Randall Dam. This allowed adequate flows to provide suitable spawning habitat in the river to Lewis and Clark Lake. Riverbed degradation and sandbar movements have decreased the effect of 20,000 cfs flows on the spawning habitat. Spawning substrate is at an elevation that requires 25,000 cfs to inundate suitable spawning habitat. These releases should be maintained into June.

Sport fishing is enhanced by flows greater than 20,000 cfs by providing good access to the river, stable flows, and minimized effects resulting from peaking. Low angler use, for example, was documented during 1984 through 1986 due to extremely low releases from Fort Randall Dam during the spring.

Of special concern in this region and the Gavins Point tailwaters section are the high concentrations of nesting terns and plovers. Releases should be coordinated to concentrate birds on suitable habitat and maintain safe habitat during the critical June and July portions of their nesting season. High water releases (35,000 cfs or higher) during the fall or winter could be used to scour existing sandbars thereby removing vegetation in addition to creating high profile sandbars. Water level management that would facilitate least tern production should be appropriate for fisheries needs as well. Flows less than 20,000 cfs during the spring period and flows less than 10,000 cfs the remainder of the year should be avoided. Water could be released from spillway to supplement flows during plant inspections. In-stream flow studies are needed to address critical life stages and associated habitat needs of existing fish populations.

Lewis and Clark Lake

Due to physical characteristics of Lewis and Clark Lake, little shoreline or aquatic vegetation exists. The few small bays that occur have been closed to the reservoir by wave and sediment action. The reservoir should be held slightly higher in the spring and slightly lower in the summer and fall so that a more normal lake-like pool is maintained through the entire year and avoid winter

drawdown to 1,204 ft. Reclamation of bays should be planned to increase shoreline development and provide additional habitat.

Elevations of 1208 ft or greater should be avoided because of extreme shoreline erosion that occurs. Shoreline damage occurs along the parks and causes damage to development areas. Shoreline vegetation would aid spawning and nursery areas.

Gavins Point Tailwaters/Lower Missouri River

The natural river portion from Gavins Point Dam to Ponca, Nebraska, harbors critically important nesting habitat for terns and plovers. We strongly suggest that a coordinated plan be developed to provide safe nesting habitat, protection from human disturbance and continued funding for needed research concerning interior least terns and piping plovers. The suggestions for the Fort Randall tailwaters would also apply to the section below Gavins Point Dam. Releases from Gavins Point traditionally are stable and we support that operating plan. We do question the need for annual de-watering for inspection because of its effect on attached organisms. If other inspection methods such as the use of divers or cameras are available, we would support that rather than de-watering. We appreciate the 1985 inspection method of maintaining adequate flows by releasing water from the spillway.

Prepared & revised by
Dennis Unkenholz
March 21, 1988

Figure III.

LAKE OAHE LEVELS, 1974-1980, 1981-1987

FT. M.S.L.

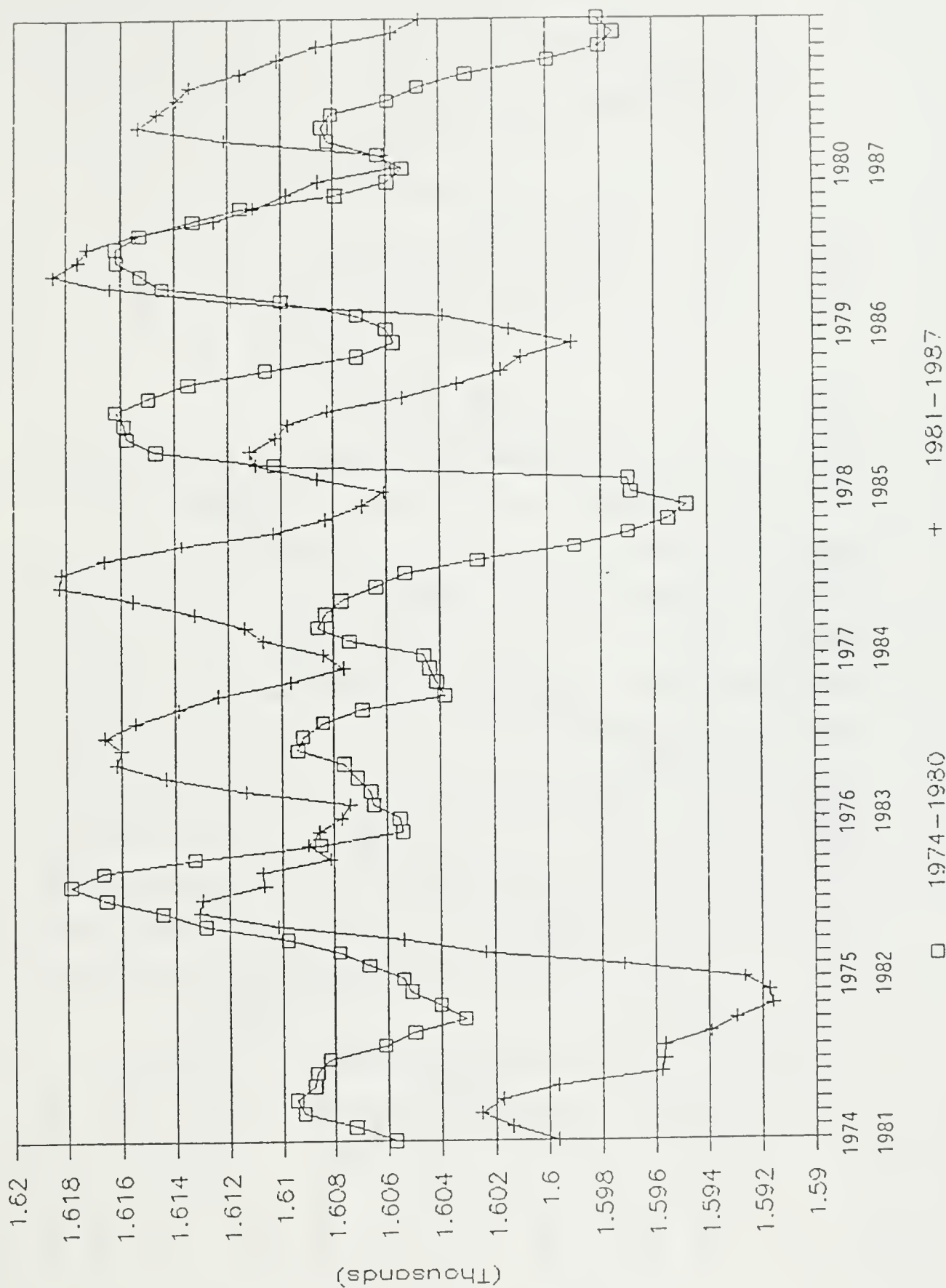
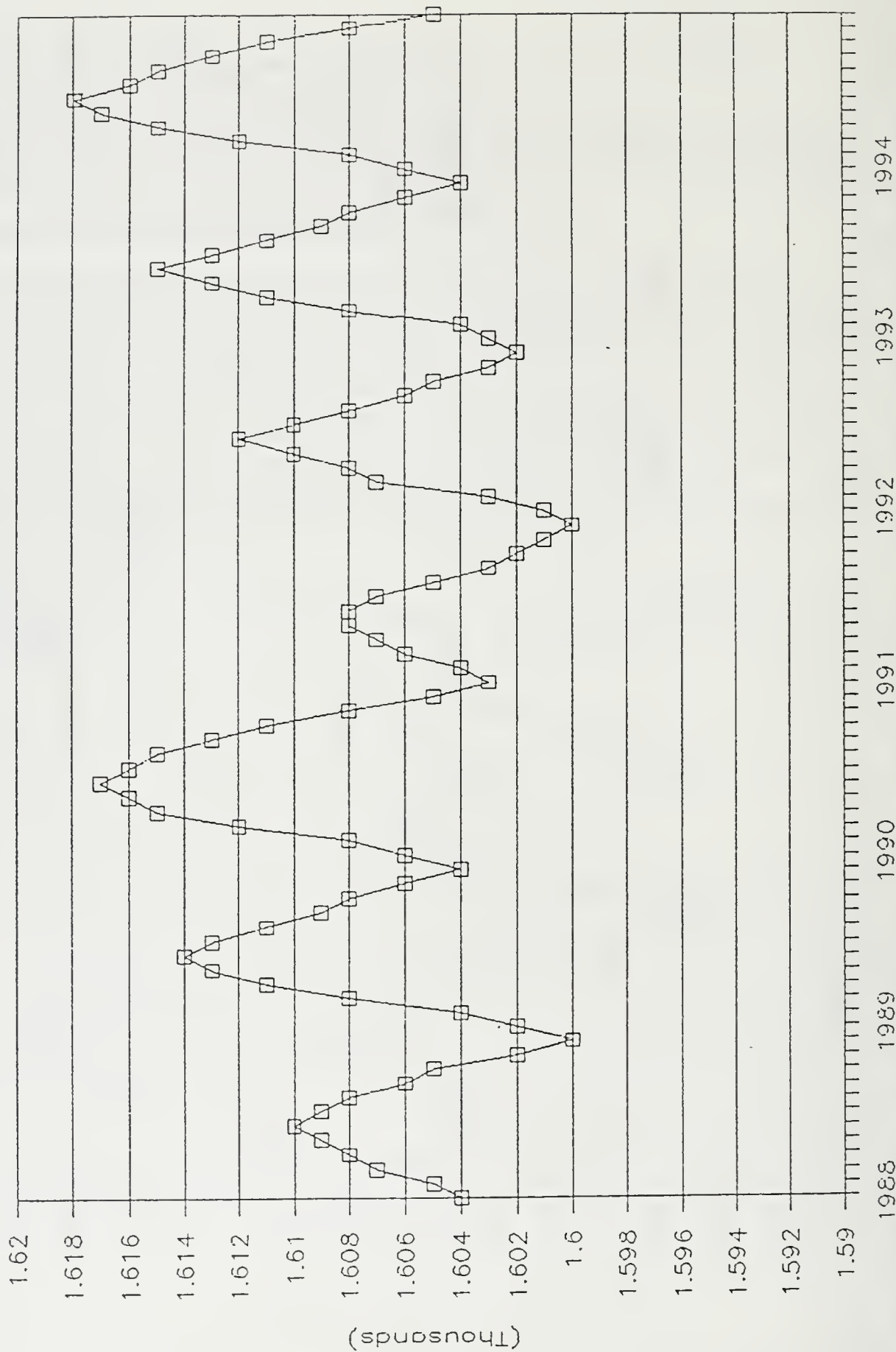


Figure IV.

LAKE OAHU LEVELS, 1988-1994

FT. M.S.L.



From DRAFT thesis
prepared by Monica Schwalbach
SDSU Coop Unit
Brookings, SD

CONCLUSIONS AND MANAGEMENT RECOMMENDATIONS

The following conclusions and recommendations for protection, management, and continued study of interior least terns and piping plovers in SD are based on the 1986 and 1987 tern and plover surveys, previous surveys, published and unpublished literature, and professional judgement. Due to the highly different water conditions between 1986 and 1987 on the mainstem Missouri, conclusive statements about some of my objectives could not be made. These conclusions should therefore be considered tentative until further information is obtained which can be compared to water and habitat conditions of 1986 or 1987.

In general, a water management strategy which allows for the earliest possible nesting and subsequent early

fledging of least terns and piping plovers is recommended. River stages below mainstem dams should be maintained at low, constant levels throughout the mid May to August nesting and brood rearing season, and major fluctuations in water levels during that period should be avoided. With early production, water releases could possibly be increased earlier in the summer when barge, marina, and other river consumer needs are more demanding because of low tributary inflows. Concurrent with this water management strategy, intensive nesting site protection would reduce the impacts of human disturbance which often result in renesting, hence later fledging by terns and plovers.

The key to protecting least terns and piping plovers is to determine the location of nesting areas and to protect, maintain, or restore this existing habitat accordingly. Since water level fluctuations affect habitat availability, habitat quality and species distribution, surveys are necessary to identify new nesting areas, confirm use of old nesting areas, monitor productivity and protect nesting sites. Until the populations of terns and plovers recover to the extent appropriate for delisting as threatened or endangered, these surveys will need to be continued on an annual basis.

Although no least terns or piping plovers were found nesting along the tailrace areas downstream of Oahe or Big Bend dams, nesting could occur there if pool elevations are reduced and habitat conditions improve. Therefore, it is desirable to continue surveys along these areas at least semi-annually. Additionally, since no least terns or piping plovers were found along the Grand, Moreau, or White rivers, annual surveys on those rivers are probably not warranted more frequently than once every 3 to 5 years.

The greatest concentrations of nesting least terns and piping plovers occurred on the Gavins Point river reach, where approximately 65% of the least terns and 90% of the piping plovers nested. Fewer least terns and piping plovers nested on the Fort Randall river reach, where the number of sites available for nesting was less. Oahe Reservoir habitats supported the least numbers of nesting terns and plovers, and nesting colonies there were small compared to those on sandbars. Beaches are evidently less desirable than sandbars as nesting sites for terns and plovers along the mainstem Missouri in SD. While future research efforts should focus on terns and plovers nesting along the Gavins Point reach because of the larger concentration of birds there, the importance of the other river reaches should not be overlooked.

Turnover rates of least tern and piping plover colonies were lowest on the Gavins Point reach, which indicated that nesting sites there were the most stable between the two years. A reduction in turnover rates can be achieved by improving the conditions on nesting sites (e.g. reduced water levels during the nesting season, protection from human disturbance, etc.). When stable nesting sites are established, management efforts can focus on intensive protection, maintenance, or restoration of specific colony sites.

Reproduction was suppressed during 1986, a high water year, due to reduced habitat availability and suitability (i.e. low mean site elevations, reduced site size, and increased likelihood of water impacts). Along Oahe Reservoir, tern and plover production improved substantially from 1986 to 1987 because pool elevations were reduced earlier in 1987. The 1987 water levels below Gavins Point Dam were more conducive to least tern and piping plover production than the 1986 water levels. Least tern and piping plover production there improved dramatically from 1986 to 1987, due to an average summer discharge which was 5000 cfs (ca. 1.0 feet) less in 1987, and to water levels which were maintained at a fairly constant stage through the nesting season. In contrast, least tern and piping plover production was poor and water levels were not conducive to

production on the Fort Randall reach, both in 1986 and 1987. There, sporadic fluctuations during both nesting seasons caused inundation of nests, considerable renesting, and site abandonment.

Water discharge plans at all SD mainstem dams should include provisions for tern and plover production until all agency goals for their protection and a sustainable level of tern and plover production are met. Based on expected water inputs and system storage the COE should set target summer stages (and accompanying discharge rates) for water levels below each dam, prior to the nesting season. Discharges should then be adjusted so that the target stage is reached by the beginning of the tern and plover nesting season (20 May at the latest). River stages should be maintained at low, constant levels throughout the mid May to August nesting and brood-rearing season. Daily and weekly fluctuations during the critical nesting period should be avoided. Stages can be adjusted later during the season (if necessary) by coordinating water level management with field surveys of nest elevations and adjusting flow rates as water conditions dictate. To reduce possible impacts of wave action on nests, a minimum of 0.5 feet elevation should be maintained as a buffer zone between the lowest active nests and water levels.

The release schedule recommended to the COE by the Nebraska Game and Parks Commission (1985) provides an example of how releases can be managed under years of different water conditions. However, since riverbed degradation below the mainstem dams continually causes a reduction in the relative water elevations and correspondingly alters the water level changes produced by differing releases, specific discharge recommendations would be of limited value. Much could be gained by evaluating the amount and quality of habitat available at different discharge rates, and summer releases could more appropriately be determined with the use of this information. By combining information on system and tributary inflows, flood control requirements, and field surveys of conditions at the nesting sites, water levels could possibly be managed with greater flexibility, and thereby accommodate other river consumer needs in conjunction with endangered species production.

Should downstream flooding during the nesting season necessitate a reduction in water releases from the mainstem dams, water levels will have to be managed to discourage terns and plovers from nesting on the newly exposed habitat. If not, a return to target water levels would inundate the new nests. River stage modeling can be combined with data on downstream tributary inflows and tern and plover nesting

information to determine appropriate release times and amounts. Observations made during the 1986 and 1987 nesting seasons indicate that terns and plovers will select nest sites at higher elevations if such sites are available on suitable nesting habitat. Also, terns and plovers will spend several days preparing nest cups before egg-laying. Therefore, short-term reductions in water releases should not be of great concern. However, if it is necessary to reduce releases for greater than 3 to 4 days, periodic increases of flows to target levels would serve to discourage nesting attempts at lower elevations.

Plans for enhancement of tern and plover production and populations by providing alternate or improved nesting areas should be made. Due to the vast differences in water conditions between 1986 and 1987, specific values for optimum site characteristics have not been delineated. Nonetheless, habitat enhancement plans should include consideration of (1) nesting area size, abundance and distribution, (2) nest to water distances, and (3) nest elevations above water levels. During normal and low flow years maximization of these attributes should be readily attained using well planned water releases. Nesting areas with optimum site conditions may then serve as nesting refuges during high water years.

Future research should include an evaluation of methods to remove vegetation from sites that are currently unsuitable for nesting and some subsequent monitoring of these manipulated areas for bird use. Devegetation of sandbars or islands by mechanical means (i.e. discing, burning) may prove valuable in restoration of nesting areas, and should be studied in further detail. New investigations should also include testing the possibility of scouring vegetation off potential nesting sites by periodically inundating them during the non-production season and then exposing them by lowering water levels during the mid May to August nesting and brood-rearing seasons.

Recreational activity is an important factor affecting the productivity of least terns and piping plovers along the mainstem Missouri River in SD. A system of active nest site protection should be developed, implemented, and maintained until population goals are reached and assured. Posters describing each species, the reason for protection, and individual personal and agency responsibilities, should be placed at each boat ramp located within 5 miles of each nesting colony. Additional warning signs should be placed at colony sites known or suspected to have frequent human disturbances. Patrols by authorized enforcement personnel should be performed periodically at each known colony. Additional enforcement attention may also be necessary

during holidays and weekends at sites known to attract recreationists. An information and education program should be coordinated between state and federal agencies with a responsibility toward protection of least terns and piping plovers along the mainstem Missouri River. .

Compared with the potential impacts of water levels and recreational activity, predation and weather are not presently considered the most important factors limiting the production of least terns and piping plovers along the mainstem Missouri River but their importance may increase in rank during any one year.

Future studies should be designed to build on baseline data gathered in this study in order to gain a better understanding of tern and plover populations with the purpose of refining management plans for protection of these endangered and threatened species in SD. Suggestions for further studies include the following, which are listed in no certain order of preference:

- 1) Determination of the quality and quantity of habitat available at different river stages.
- 2) Determination of the temporal changes in the quality and quantity of nesting habitat.
- 3) Determination of the long term effects of Missouri

River aggradation and degradation on tern and plover nesting habitat.

- 4) Evaluation of how alternative nesting areas benefit species abundance and production.
- 5) Assessment of food availability as a potential factor limiting tern and plover distribution and production.
- 6) Assessment of site protection as a strategy to improve tern and plover site tenacity and production. /
- 7) Development of a model for determining accurate water elevations at given locations at specific discharge rates for the entire mainstem Missouri River.

1988 South Dakota Missouri River Reservoir
Water Levels and Tailwater Release Recommendations

Natural cycles of dry and wet conditions that yields below and above average values in the Missouri River basin are important to fish production. The first high water year following a two year low in reservoir water levels produces a large year class of nearly all species. Historically water, level recommendations have been developed to compensate for any unfavorable conditions. Management of the unbalanced system may provide flexibility to develop a scenario of water levels to produce good fish production once out of 3 years.

As with our fisheries resources, recommendations involving endangered least terns and threatened piping plovers should also be considered. To assist with your planning we have enclosed a section of Monica Schwalbach's draft thesis which provides management guidelines. In addition, if the entire recommendation package is followed, we see no conflicts between fisheries goals and management of terns and plovers. We have also included tern and plover recommendations in the generalized water management section.

Water level requests will be presented by reservoir or tailwater reach. A generalized water plan for the Missouri River is attached. That plan explains the rationale for management recommendations and extremes to avoid. The 1988 recommendations follow the generalized water management plan but inject elevations and needs appropriate for this season.

Lake Oahe

Water level requests for Oahe are to hold maximum elevation below 1609. No vegetation exists below 1618 elevation. Extremely high water levels in 1987 precluded any vegetation re-growth as the reservoir filled to approximately 1618.

The total absence of shoreline vegetation negates any reasonable amount of northern pike reproduction or reproduction of species that require vegetation to be successful. Northern pike have not had a successful spawn since 1982.

Plans are to grow vegetation above 1609, to recommend the 1989 elevation not exceed 1609, and then plan a rise in 1990 that would inundate vegetation above 1609.

The scenario of providing two years of low levels followed by a high year to flood re-grown vegetation and produce a strong year class of fish one year out of three has occurred naturally. This same water level regime could be manipulated artificially by using the storage flexibility in the unbalanced system.

No special elevations are required during 1988 for construction of projects. Fall elevations below 1596 would allow extension of boat ramps and the fish ladder at Whitlocks but are not formally requested.

Oahe Tailwaters

Tailwater releases should not drop below 10,000 cfs on weekends during April - September. This would enhance use by the public and stabilize aquatic habitat in the river from the dam to the upper end of Lake Sharpe and potentially prevent ice jams during the winter.

Habitat in the river below Oahe Dam becomes unusable by aquatic organisms when low flows exist. This displaces fish and other aquatic animals and thus impacts stability of the aquatic community in this valuable river reach.

Lake Sharpe

Due to the usual stable operation of Lake Sharpe, we offer no changes to current operating plans for that reservoir. The sport fishery in Lake Sharpe appears to be the most stable walleye fishery of the four reservoirs.

Big Bend Dam Tailwaters

Maintain an instantaneous release of 10,000 cfs to stabilize fishing over the weekend and minimize affect of fluctuating water levels on fish.

Lake Francis Case

A stable to rising reservoir elevation, which approaches elevation 1356 by mid-April, and then remains stable to slightly rising until early June appears to be one important factor for successful walleye spawning in Lake Francis Case. As documented in COE funded work by Michaletz (1985) small drops in reservoir elevation will have significant impacts on incubating eggs. Walleye egg incubation generally commences in mid-April and hatch usually will conclude by the third week in May. Communication from the COE the past two springs regarding timing of decreases in reservoir elevations has been greatly appreciated and has undoubtedly played a role in the successful walleye reproduction observed during 1986 and 1987. Maintaining elevation 1356 until June is also important to provide enough water depth in the area of the reservoir near the White River where paddlefish brood stock are collected, as well as aiding reproduction of species such as yellow perch, emerald shiners, crappies and white bass.

Shoreline vegetation is nonexistent in Lake Francis Case. Reduction of reservoir elevation to 1354 by July 1 will allow a major portion of the growing season for shoreline revegetation. Northern pike, a species which needs flooded terrestrial vegetation to spawn, is desired by anglers coming to LFC and at one time was an important sport fish in this reservoir. Recent work by the SDGF&P to reestablish this species through a hatchery stocking program and subimpoundment system, has now appeared to increase northern pike population levels to a point that sufficient numbers of mature fish should exist during 1988 and 1989 to spawn naturally, should suitable habitat conditions exist.

A delay of the fall drawdown by one month is requested to facilitate fall boating and fishing. Nearly all boat ramps become unusable following the fall drawdown.

Fort Randall Tailwaters

Stable or increasing instantaneous releases of 20,000 cfs minimum from mid-April through June are requested for Ft. Randall Dam. This would allow adequate flows to provide suitable spawning habitat in the river to Lewis and Clark Lake. Riverbed degradation and sandbar movements have decreased the effect of 15,000 cfs flows on the walleye, sauger and paddlefish spawning habitat. Spawning substrate is at an elevation that requires 20,000 cfs to inundate suitable habitat.

Sport fishing is enhanced by flows greater than 20,000 cfs by providing good access to the river, stable flows, and minimized effects resulting from peaking. Low angler use was documented during 1984 - 1986 due to extremely low releases from Ft. Randall Dam during the spring. However, angling below Ft. Randall was greatly improved in 1987, in part due to more suitable water conditions below the dam.

Lewis and Clark Lake

Due to physical characteristics of Lewis and Clark Lake, little shoreline or aquatic vegetation exists. The few small bays that occur have been closed to the reservoir by wave and sediment action. The reservoir should be held slightly higher in the spring and slightly lower in the summer and fall so that a more normal lake-like pool is maintained through the entire year.

Gavins Point Tailwaters/Lower Missouri River

Fisheries suggestions for the Ft. Randall tailwaters would also apply to the section below Gavins Point Dam. Releases from Gavins Point traditionally are stable and we support that operating plan. We do question the need for annual de-watering for inspection because of its effect on attached organisms. If other inspection methods such as the use of divers or cameras are available, we would support that rather than de-watering. We appreciate the 1985 inspection method of maintaining adequate flows by releasing water from the spillway.

The following list describes the species, numbers and location of fish stocking for the South Dakota portion of the Missouri River:

PLANNED 1988 FISH STOCKINGS

Oahe Reservoir

Walleye	477,000 Fgl.
Smallmouth Bass	150,000 Fgl.
Chinook Salmon	1,000,000 Fgl.
Steelhead Trout	50,000 Ylg.
Brown Trout	75,000 Ylg.

Spring Creek Subimpoundment

Northern Pike	90 Prespawners
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Lake Sharpe/Oahe Tailwaters

Tiger Musky	50,000 Fgl.
Paddlefish	25,000 Fgl.
Bluegill	250,000 Fgl.
Largemouth Bass	50,000 Fgl.

Oahe Subimpoundment

Smallmouth Bass	50,000 Fgl.
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Lake Francis Case/Big Bend Tailwaters

Walleye	250,000 Fgl.
Northern Pike	200,000 Fgl.
Paddlefish	25,000 Fgl.
White Crappie	250,000 Fgl.
Smallmouth Bass	125,000 Fgl.
Brown Trout	50,000 Ylg.

Platte Creek Subimpoundment

Northern Pike	60 prespawners
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Lewis and Clark/Ft. Randall Tailwaters

Walleye	250,000 Fgl.
Musky	50,000 Fgl.
White Crappie	250,000 Fgl.
Brown Trout	20,000 Fgl.

Lewis and Clark Tailwaters

Musky	50,000 Fgl.
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UNITED STATES DEPARTMENT OF THE INTERIOR
FISH AND WILDLIFE SERVICE
Post Office Box 986
Pierre, South Dakota 57501

January 26, 1989

MEMORANDUM

TO : MRNRC Members

FROM : MRNRC Coordinator
Pierre, South Dakota

SUBJECT: Summary of August 29-31, 1988, MRNRC Meeting in Helena

Attached are copies of the meeting agenda and attendance roster. High points and decision items are recorded for the record and as a means of sharing information with those who could not attend.

Much credit is due Larry Peterman and the Montana Fish, Wildlife and Parks' staff for an excellent session. The days were filled with useful information for carrying out work of the Committee. This was the first summer working session, as agreed to at the previous fall meeting. Purpose of the meeting was to better provide timely and meaningful input to the Corps that would fit development of their Annual Operating Plan, which comes out in the fall. An additional benefit was that members can see various river systems and become more attuned to the whole Missouri River resource. It also provides an opportunity for the host state to go into some detail on its management perspective, concerns, and future plans for the river.

Pat Graham introduced us to Montana's fishery program. One of the most pressing issues in Montana is allocation of water rights. This state has the ability to allocate instream fishery flows. One of the major goals of the Department is to supply quality diversity.

A trip down the Missouri was offered by various staff through the aid of slides. Fred Nelson introduced us to the headwaters. Mark Lere described the resources and the problems of the upper reservoirs. Of particular interest, he described the work of a steering committee consisting of the Bureau of Reclamation, Montana Power, the Department, homeowners, river guides, the local irrigation district, and Trout Unlimited which meets to discuss management of the three upper dams. Montana has generally had good results working with this steering committee structure (which may portend to a useable process for other river reaches downriver). Steve

Leeth described the Blue Ribbon fishery reach below Holter Dam and the recreational value of the fishery. Chan Biggs, Bureau of Land Management, Lewistown, provided a slide trip down the 149-mile long Wild and Scenic River section between Fort Benton and James Kipp Park. He described the area as a "living natural history museum" which has retained much of the character of the river as Lewis and Clark had found it in the early 1800's. Bill Wiedenheft described the fishery resource of Fort Peck and the management goals and philosophy of the Department in managing Peck. Pat Clancey described the reach downriver of Fort Peck Dam and showed a recent underwater video of shovelnose and pallid sturgeons taken below the dam this last winter. Our introduction to the river was capped off with an evening float trip which was thoroughly enjoyed by everyone. [Note: The above is a greatly condensed report of the information presented and does not do justice to the highly professional and informative presentations made. However, for the sake of brevity, it is presented as such.]

John Thorson, Northern Lights Institute, briefed us on the work of his group and the ongoing efforts of the Missouri Basin States Association (MBSA). Northern Lights sponsored two conferences on Missouri River issues and is in its final phase under existing grants to finish a series of issue briefs and its work on data management. Of special interest, they intend to add a fish and wildlife issue brief to their series in the next six to eight months. In the near future, Northern Lights will assist a special caucus of the tribes interested in expanding dialogue on the Missouri River. They will also provide a facilitator for a MBSA retreat where the MBSA plans to re-examine its future role. If funded through a new grant, they intend to host a Missouri River Assembly next year in which the MRNRC will have representation. Thorson reported that the MBSA is going through a process of reaffirming its role. At present, they have examined four areas: communications, data gathering, greater presence in policy issues, and education.

Kent Keenlyne briefly discussed what current studies are ongoing on least terns and piping plovers and how deliberations on these species have fit into recommendations for river management. In some states (where functions are combined under a single agency), MRNRC members have coordinated their comments with non-game people before submitting an agency recommendation. To date, recommendations for the birds have been supportive of fishery interests.

The Service has received a petition to list the pallid sturgeon under the Endangered Species Act, and Keenlyne has been charged with collecting data on the species for the Service. A question on coordinating protocol for the handling of pallids was raised (issue was further discussed during business meeting).

Dave Wooster provided handouts and a discussion on reservoir operations and the Annual Operating Plan (AOP). After considerable discussion, a better understanding of how we can better interface with the Corps was achieved. For this year, the states will send their generic water management recommendations to the Coordinator to compile and send to the Corps' Reservoir Control Center. Recognizing that water level and flow

projections for the remainder of the year were only received at this meeting, and that present year fishery data will not be analyzed until late fall. "draft" comments will be sent to Wooster to aid in development of an AOP. Since the draft AOP will not be released until September or October, there will be an opportunity to revise comments and recommendations later, once all the fishery data has been gathered and analyzed. The final AOP for the next year is normally prepared for a late October public meeting held by the Reservoir Control Center.

Next year, the Coordinator will send a letter to the Corps about the first of August requesting that the computer-generated water projection data (as handed out at this meeting) be sent to the respective states. Wooster will have the print-outs to the states a couple weeks before this annual meeting, and the states will send their recommendations to the Coordinator about a week before the meeting. Included in the responses are how things went last year (in relation to the recommendations) and the preliminary recommendations for the upcoming water year (January through December). The Coordinator will compile the comments and note any areas of conflicting recommendations. Conflicting recommendations would be discussed during the meeting and a coordinated recommendation prepared. Intentions are to send the MRNRC comments to the Corps the first week of September with revised comments in mid-October. We would continue to "fine-tune" recommendations in March with updated data from the Corps which included snowpack and runoff projections.

Time became a factor in developing resource issues from members. Montana briefly discussed a proposal they had received for a white sturgeon farm near Lewistown to be developed on a Missouri River tributary. Eggs would be brought in and fish raised in 40 circular ponds. Fish would be harvested at five to six pounds with a total of one to two million pounds per year. The group proposing the farm has had ongoing success with raising sturgeon and has volunteered expertise to help with pallid sturgeon propagation.

Ken Brunson and Norm Stucky briefly discussed the 1986 mitigation authorization of \$51.9 million for habitat losses due to Federal levee development along the lower river. At present they are reviewing possible establishment of a trust fund for mitigation since appropriation of funds has been a problem. Larry Peterman discussed a problem with NOAA in regard to use of commercial fishery funds. Thought was that the MRNRC charter could perhaps serve to meet the needs of a "coordinated fishery program" for NOAA so that the States could use the commercial fishery funding source.

At the business meeting, it was concluded that this meeting format was well worthwhile and should be continued. Stucky suggested that, at future meetings, each state give an update about ongoing Missouri River studies within their respective states. Another agenda item for the next meeting was development of long-range fishery plans for drought situations with special focus on upstream and downstream trade-offs. Two meetings were viewed as necessary to run the Committee's business. A longer July or August meeting along with a limited March meeting in association with the

"fine-tuning" meeting with the Corps was viewed as best serving the needs of the Committee. The March meeting in Omaha was envisioned as a half-day meeting in the afternoon with a session with the Corps the following forenoon.

Other business items related to assigned tasks for members. Although considered a worthwhile project, the Benson proposal for a fishery book on the Missouri was viewed as a large task that, at present, the states would have difficulty obtaining adequate staff time to write. There is apparently an ongoing project by John Madsen to write a book on the Missouri River which needed to be checked on to assure that duplication of effort would not happen. Peterman would contact Benson and John Thorson about what is being planned in regard to preparation of a book. Protocol for handling pallid sturgeons was discussed, and Pat Clancey, Montana, will send out a draft protocol paper he has been working on to the members to initiate discussion. Dennis Unkenholz will contact the Dakota Chapter, American Fisheries Society, to try to get a follow-up session on the pallid at the annual meeting similar to one held at the Chapter's meeting last year. Unkenholz handed out a draft paper on the background of the Reservoir Operation Standing Committee of the Dakota's Chapter of the American Fisheries Society, which was the forerunner of this group, and asked for any comments or revisions.

The next annual meeting will be hosted by Kansas at a place and date yet to be decided. Ken Brunson, Chairman Elect, asked that members send suggestions for agenda items to him.

Leont Heenlyne

MRNRC MEMBERS MEETING

August 29 to 31, 1988

Helena, Montana

Commission Room - MDFWP

AGENDA

Monday - 29th - 2:00 P.M.

1. Opening Remarks and Introductions
2. Agenda Approval
3. Montana's Fishery Program
4. The Missouri River in Montana
 - a. Missouri Headwaters
 - b. Upper Reservoirs
 - c. Blue Ribbon
 - d. Wild and Scenic
 - e. Fort Peck

Tuesday - 30th - 8:30 A.M.

5. Status Reports
 - a. Missouri Basin States Association
 - b. Northern Lights Missouri River Project
6. Threatened and Endangered Species Status
 - a. Least Tern
 - b. Piping Plover
 - c. Pallid Sturgeon Request for Listing
7. Reservoir Operations
 - a. Long Term Recommendations
 - b. Annual Recommendations
 - c. Reservoir Operations During Current Drought
8. Interstate Studies

Wednesday - 31st - 8:30 A.M.

9. Resource Issues From Members
10. MRNRC Business Meeting
 - a. Charter
 - b. Committees
 - c. Funding
 - d. Annual Meeting Location
 - e. Evaluation of Meeting
 - f. Other Business



Missouri River Natural Resources Committee

August 29-31, 1988
Helena, MT

Larry Peterman	MDFWP	1420 East 6th Ave. Helena, MT 59620	(406)444-3183
Tom Gengerke	DNR	RR Box 7722 Spirit Lake, IA 51360	(712)336-1714
Kent Keenlyne	FWS	Box 986 Pierre, SD 57501	(605)224-8693
Wes Sheets	Game & Parks	2200 N. 33rd St. Lincoln, NE 68503	(402)464-0641
Norm Stucky	Dept. of Conser- vation	Box 180 Jefferson City, MO 65109	(314)751-4115
Ken Brunson	Wildlife & Parks	Box 54a, Rt. 2 Pratt, KS 67124	(316)672-5911
Dennis Unkenholz	Game & Fish	Anderson Building Pierre, SD	(605)773-5535
Jim Ragan	Game & Fish	100 N. Bismarck Expwy Bismarck, ND	(701)221-6300
Emil Berard	Game & Fish	Riverdale, ND	(701)654-7475
Mark Lere	MDFWP	1420 E. 6th Avenue Helena, MT	(406)443-7681
Pat Clancey	MDFWP	Box 265 Fort Peck, MT	(406)526-3582
James Riis	Game & Fish	Anderson Building Pierre, SD	(605)773-5535
Kemper McMaster	USFWS	U.S. Federal Bldg. P.O. Box 10023 Helena, MT 59626	(406)449-5225
Wayne Brewster	USFWS	U.S. Federal Bldg. P.O. Box 10023 Helena, MT 59626	(406)449-5225

Bill Wiedenheft	MDFWP	Box 126 Fort Peck, MT	(406)526-3471
Ken Frazer	MDFWP	Box 848 East Helena, MT	(406)444-3762
Fred Nelson	MDFWP	1400 S. 19th Bozeman, MT	(406)994-6937
Chan Biggs	BLM	Airport Road Lewistown, MT	
Dave Wooster	Corps	Omaha, NE (Division)	(402)221-7350

Presentation by Kent Keenlyne
Missouri River Coordinator

at
Agency Meeting on Missouri River Water Control

April 7, 1988
Peter Kiewit Conference Center
Omaha, Nebraska

Good morning. During the last few meetings of this group, you have heard Duane (Sveum) talk about recent efforts to "unbalance" the system to benefit fishery production. Since this is a fairly new concept to many of you, I thought I would try to explain the background and the reasons for attempting to do this and what is hoped to be achieved through the effort.

Duane mentioned that the Corps meets annually with the Missouri River Natural Resources Committee (MRNRC) to obtain coordinated recommendations for management of the water for fishery purposes and, recently, state recommendations for downstream releases for terns and plovers. Until the MRNRC was formed, the fishery management recommendations were obtained through a committee of American Fishery Society (Society) members. However, over the years, problems developed as new Society chapters developed, which split the group and made coordination more difficult. Also, not being sanctioned (or "official") representatives of the state, sometimes conflicts would occur between various wildlife related interests, even within a single state. Formation of the Committee, with official representatives of all the states, has made life a little easier for the Reservoir Control Center.

The "offset" or "unbalanced" system concept was actually conceived while working with the ad-hoc Society group. Since many of the same individuals previously involved are now official MRNRC representatives, it was an easy transition to continue with the concept. With the aid of some slides, I will try to explain what we hope to accomplish by unbalancing the system.

Slide 1 - The "unbalancing" actually only refers to the three upper dams where most of the system storage takes place and where fluctuations are the greatest.

Slide 2 - As with most new reservoirs, fishing can be fantastic following initial filling. Normally, the fishery peaks in 7 to 10 years as new habitat is formed, nutrients are released to the system, and fish populations boom. With these large basically cold-water reservoirs that filled gradually over several years, the peaks did not occur until 15 to 20 years after closing. In this 1972 slide, Garrison claimed itself as the northern pike capitol of the world. The astounding fishing for these trophy fish brought renown (and people) from throughout the Midwest to fish in the "Great Lakes" of the Dakotas. But how is it that the northern fishery did not continue indefinitely?

Slide 3 - I recently came across some slides taken by the North Central Reservoir Investigations fishery team as Oahe was filling. This is a slide of a northern pike study site on a place called Oak Creek off what is now the Cheyenne River arm. What I would like you to notice is the abundance of vegetation at this site, including the extensive mat of prairie grasses.

Slide 4 - The preferred spawning area of northern pike is in shallow water on grassy vegetation. The vegetation helps keep the strings of eggs off the ground which is important for hatching. Eggs deposited on the ground or in barren areas are highly subject to siltation problems, which can come in the form of physical injury to the eggs as they are rolled around, problems with adequate oxygen supply necessary for maturation, or increased risk of fungal growth. The grass also serves another purpose, however, once the eggs hatch. Before the young become fully mobile, the grass provides cover for the young fry. I would like you to note the point of land in the photo behind the little tree in the right central foreground.

Slide 5 - The little point is near the left center of this photo. Fishery crews found heavy use of this area by adult northern pike during the early spring spawning season along with eggs deposited on the vegetation.

Slide 6 - This is the same area in May 1965 when the crew found many northern fry in the area. Note that the water is still rising, and imagine how well protected the area is from wind and siltation problems.

Slide 7 - The crews also worked further down toward the bay. Notice the abundance of vegetative material which released tons of carbon, nitrogen, and phosphorus which was captured into the food cycle. Dave (Wooster) earlier showed a slide which indicated Oahe did not finally fill until 1967. In effect, this "ideal" spawning and nutrient supply situation occurred for several years in succession which allowed the pike population to explode.

Slide 8 - This is a water sample taken in mid-summer from such a grassy area. Small aquatic organisms also boomed as the reservoirs filled and captured nutrients which fed the whole system. For the young northerns, the situation was nearly ideal - high hatching rates because of ideal spawning substrate, abundant cover for the newly hatched fry, and literally tons of food to give them a healthy start.

Slide 9 - This photo was taken in the upriver end of Oahe in 1966. If you can recall how many raked leaves you had last fall from the few trees around your yard, imagine how many tons of leaves must have entered the system when thousands of acres of these big, old cottonwoods shed their leaves.

Slide 10 - This is the same approximate area two years later in 1968. The trees are now dead due to inundation and no longer contribute leaves to revitalize the food chain. However, their trunks and the submerged (and decaying) prairie soils will continue to contribute nutrients to the system for a few more years. Nutrient supplies, however, will never again be as high as they were when the reservoir first filled.

Slide 11 - Contrast this to what we now have. The trees are gone and no longer contribute leaves to feed the system, the tree trunks have already pretty much disappeared and no longer contribute nutrients, the prairie grasses are no longer flooded to either supply spawning areas or feed the system, and the prairie soils have been pretty much eroded away leaving only the shale substrate.

Slide 12 - Where we focus our attention is on the mud flats and bay areas where periodic flooding occurs.

Slide 13 - This photo was taken in 1975, which shows how the fluctuation zone has been converted from prairie grasses to an area of yearly succession by annual plants. What we attempt to accomplish is hold these areas back from annual flooding to allow biennials like grasses, which are better spawning and nursery substrates, to become established.

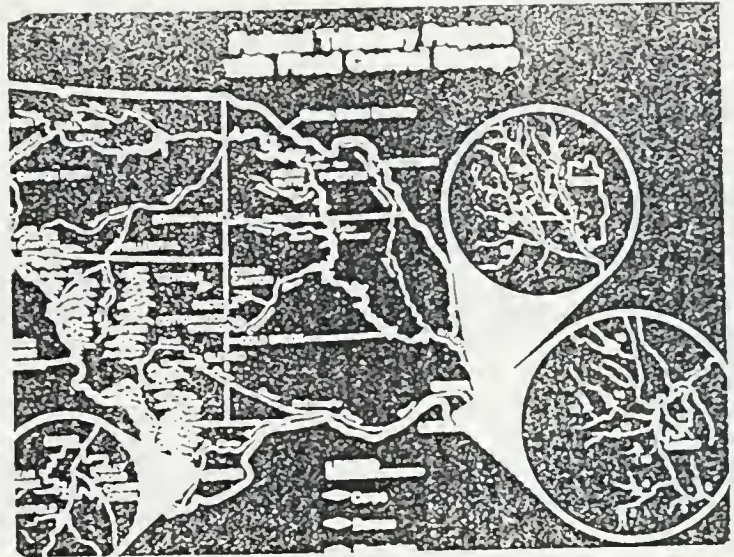
Slide 14 - After two to three years of not being flooded, we hope to achieve results like this which better simulate the habitat as the reservoirs filled. In offsetting the system, we consciously hold one of the three reservoirs down two or three years, when possible, to try to establish suitable vegetation to support spawning. We then re-flood gradually over a two-year period to capitalize maximally on our efforts. By rotating the reservoirs, we attempt to get a good year class of fish at least once every two or three years.

Slide 15 - One of the problems we encounter is that the cattle also like to utilize these areas and have their own ideas about use of the grass.

Slide 16 - Of course, all our efforts are for naught if we can not mesh the rise of the water with the spawning of the fish. Similarly, if we drop the water after the fish have spawned, so that the eggs are exposed or the young are flushed out while still dependent on the nursery, the entire effort will not yield results, for the entire year class may be lost. This photo is of the upper end of Lake Sharpe which is a noted area for spawning fish. As I left the airport yesterday, much of the shoreline was exposed mud flat. The lake had been drawn down as an aid to recover the bodies of a couple fishermen that had presumably drowned a few days ago. I do not wish to seem insensitive, but a drawdown at this time during the onset of walleye spawning can have a tremendous impact on the success of the fish. The backwater areas contain much warmer water than the channel seen in the background. The drawdown drains the warmer water into the lake to be subsequently filled with water that may be as much as 20 degrees cooler in a matter of days. Such abrupt extremes can have major effects on the aquatic system, and it would not be unlikely that the walleyes that are in this area in spawning or pre-spawning condition will be completely stopped this year by this one action.

I realize I have only had time to hit the high points on this subject, but would be more than happy to further discuss this with you at our break if you have any questions.





Slide 1



Slide 2



Slide 3



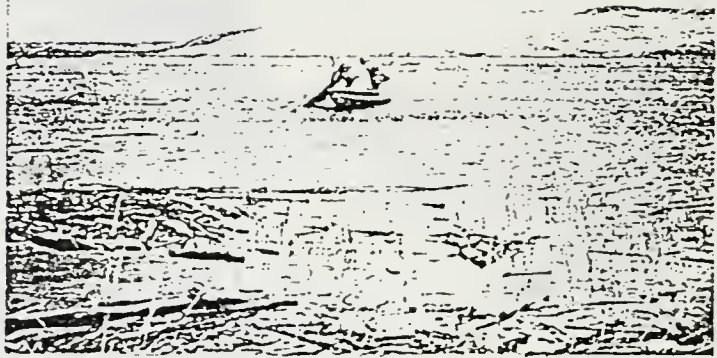
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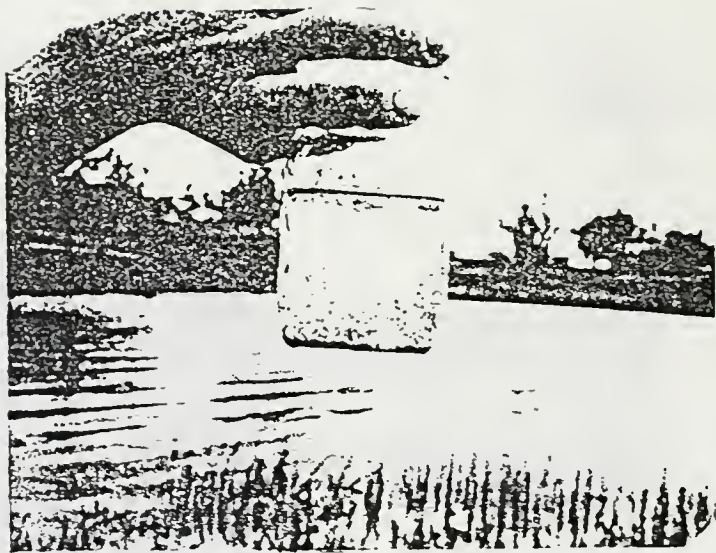
Slide 5



Slide 6



Slide 7



Slide 8



Slide 9



Slide 10



Slide 11



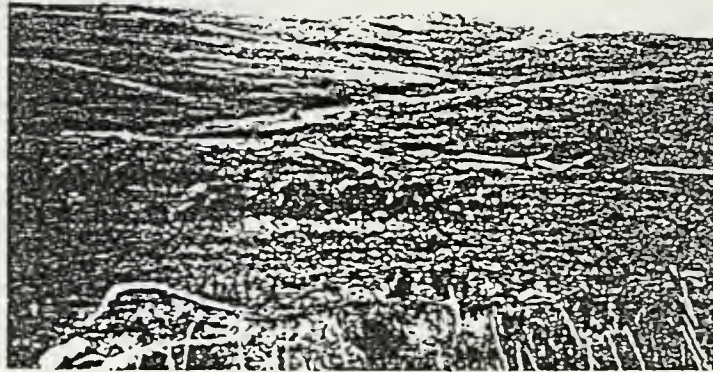
Slide 12



Slide 13



Slide 14



Slide 15



Slide 16

**Montana Department
of
Fish, Wildlife & Parks**



1420 East Sixth Avenue
Helena, Montana 59620
January 26, 1988

Kent Keenlyne
Missouri River Coordinator
Fish and Wildlife Service
Post Office Box 986
Pierre, SD 57501

Dear Kent:

I am enclosing our 1985 water level operating plan for Fort Peck Reservoir. That plan reflects our thoughts on a long range operating plan for Fort Peck. I have also included a recent memo from Bill Wiedenheft concerning water level management for Fort Peck. That memo contains additional information for our long range plan.

Thanks for preparing and sending out the minutes in a timely fashion. I think that good communication will go a long way toward making this a functioning committee. Feel free to contact Bill Wiedenheft if you have any questions concerning the long range recommendations for Fort Peck.

Sincerely,

Larry G. Peterman

Larry Peterman, Bureau Chief
Research/Special Projects
Fisheries Division

dr





*Montana Department of
Fish, Wildlife & Parks*

RECEIVED

DEC 7 1987

FISHERIES DIV.

Office Memorandum

TO : Larry Peterman

DATE: Dec. 3, 1987

FROM : Bill Wiedenheft

SUBJECT: Water Level Management Ft. Peck Reservoir

I thought it might be easier to understand where we are, and what our long range plans are, with regard to water level management, by looking at the enclosed graphs.

You will note that water levels far exceeded the desired gradual rise in 1986, and in 1987 water levels were still a little high to fit our long range plan, Graph A. If we continue to adhere to our long range goals, water levels in 1988 should ideally hit 2240', or slightly higher to inundate shoreline vegetation established last summer.

Let me point out that although our long range goals were not perfectly met in '86 and '87, the fishery did benefit from the '85 draw down and subsequent rise. This is a much better situation than having levels continue to peak at the same elevation year after year.

Once our target elevation of 2240' has been met in '88, we should shoot for a significant draw down in '89. This will again set the stage for a gradual rise (approximately 5 foot increments annually) over the succeeding 3 years, Graph B. Ideally then, this formula would be followed indefinitely as closely as mother nature allows.

One thing that we failed to discuss on the phone was discharge recommendations below the dam:

A minimum instantaneous flow of 7,800 cfs should be maintained from April 1 through September 30 to provide optimum spawning and rearing conditions for rainbow trout. An instantaneous discharge of 4,500 cfs is the absolute minimum needed to sustain recruitment. After September 30, a minimum instantaneous discharge should be maintained at, or above, 2,700 cfs.

As is always stated in our annual recommendations, should there be a conflict between meeting the desired discharges below the dam and water levels for the reservoir; the water levels recommended for the reservoir should receive priority.

Fort Peck Reservoir, like most large impoundments, is multipurpose and is currently managed to provide water for hydroelectric power, irrigation, downstream navigation and flood control. Another use, which currently seems to have been overlooked, is recreation. It is believed that with proper water level management the overall productivity of the fishery can be enhanced.

Reservoirs that fluctuate as Fort Peck, have littoral zones which are very unstable. This results in loss of vascular aquatic and terrestrial plants and the associated populations of phytoplankton and benthic organisms. Lack of submerged vegetation causes a decline in the overall productivity of the entire fish population by reducing food supply, spawning substrate, and cover for forage fish, as well as rearing areas for other fish species.

If a suitable water level management plan is implemented, shoreline vegetation can be encouraged to grow and productivity of the littoral zone can be improved. The following plan is submitted as a method to accomplish this goal:

1. Maximum pool should be established at 2240 msl. If, during a year of high runoff, the flood pool at 2246 msl is attained, then an area of vegetation will have been established just above 2240.
2. Several years of water levels being operated in the same static range is to be avoided. If this situation occurs, it is recommended that the summer peak be eliminated every third year to promote growth of shoreline vegetation.
3. In drought years the pool should be dropped to 2225 or lower and gradually raised in 5-foot annual increments to preserve vegetation established at higher levels for future years. The raise should be terminated when maximum pool, or an elevation of 2240 msl is attained.
4. To accommodate spring spawning fish, it is recommended that the water level rise as soon as possible (May). We realize that in some years natural mountain runoff does not occur at this time; however, water releases could be reduced in spring to facilitate flooding of shoreline vegetation at the earliest date possible. If this cannot be achieved, we recommend that the level be brought up at least by late June or early July to provide cover and rearing area for young-of-year fish.

TITLES:
MAXIMUM WATER ELEVATIONS
FORT PELL RESERVOIR

AXIS LABELS:
X: MONTH
YEAR
Y: ELEVATIONS

VARIABLE 1:

VARIABLE 1:		Elevations
YEAR	X-AXIS	Y-AXIS
J '82	0	3.85
	1	3.84
	2	3.92
	3	3.99
	4	3.95
	5	3.31
	6	3.68
	7	3.49
	8	3.44
	9	3.97
J '83	0	3.28
	1	3.07
	2	3.53
	3	3.72
	4	3.88
	5	3.49
	6	3.83
	7	4.16
	8	3.93
	9	4.06
J '84	0	3.59
	1	3.66
	2	3.95
	3	3.7
	4	3.88
	5	3.93
	6	4.33
	7	4.71
	8	4.99
	9	4.01
J '85	0	3.55
	1	3.68
	2	3.64
	3	3.92
	4	3.6
	5	3.91
	6	3.81
	7	3.76
	8	3.46
	9	3.34
J '86	0	3.73
	1	3.26
	2	3.69
	3	3.67
	4	3.11
	5	3.03
	6	3.54
	7	3.05
	8	3.51
	9	3.49
J '87	0	3.42
	1	3.79
	2	3.27
	3	3.91
	4	3.4
	5	3.49
	6	3.91
	7	3.61
	8	3.38
	9	3.41



WATER LEVEL OPERATING PLAN FOR FORT PECK RESERVOIR
(LONG RANGE PLAN)

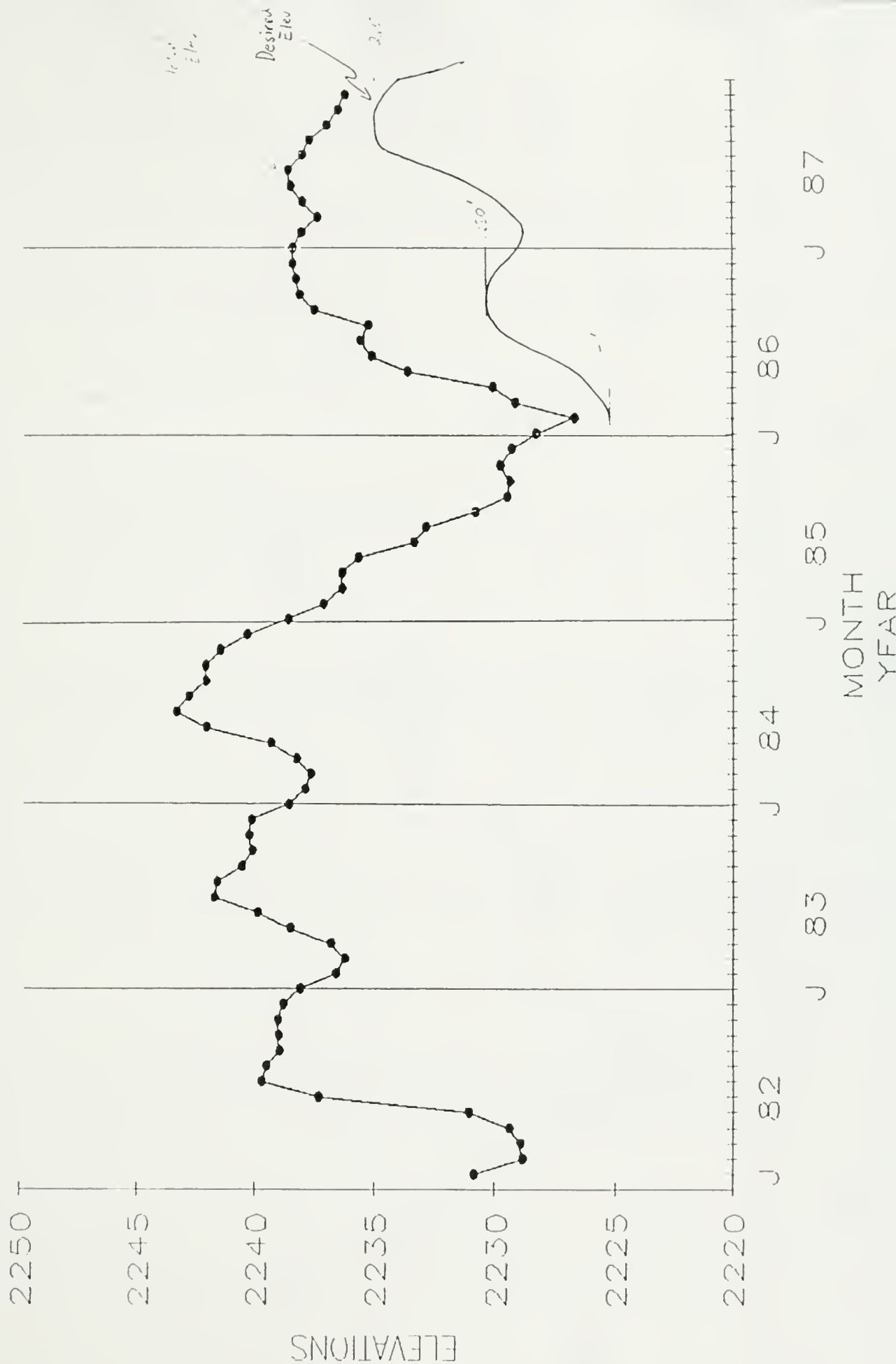
Fort Peck reservoir, like most large impoundments, is multipurpose and is currently managed to provide water for hydroelectric power, irrigation, downstream navigation and flood control. Another use, which currently seems to have been overlooked, is recreation. It is believed that with proper water level management the overall productivity of the fishery can be enhanced.

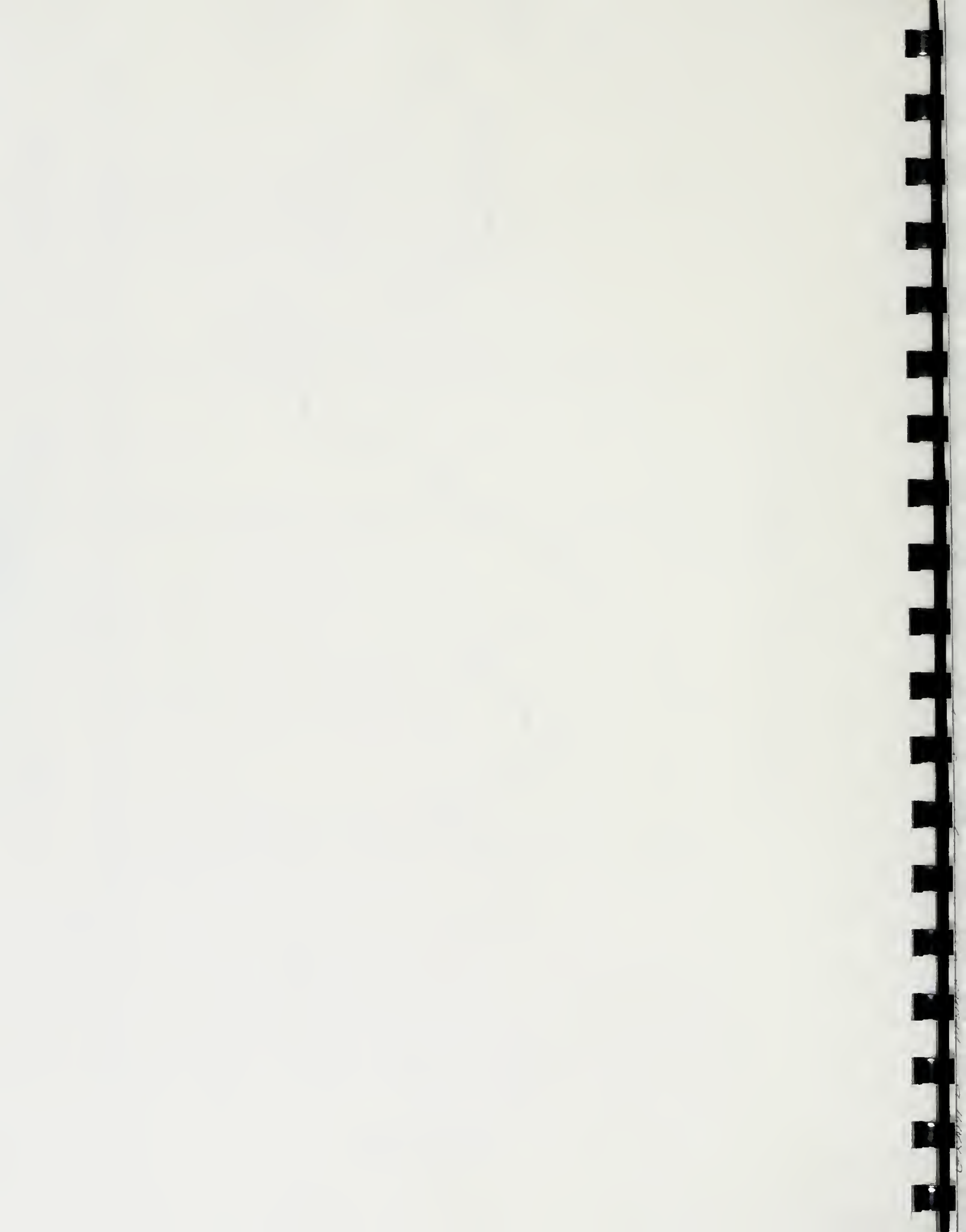
Reservoirs that fluctuate as Fort Peck, have littoral zones which are very unstable. This results in loss of vascular aquatic and terrestrial plants and the associated populations of phytoplankton and benthic organisms. Lack of submerged vegetation causes a decline in the overall productivity of the entire fish population by reducing food supply, spawning substrate, and cover for forage fish, as well as rearing area for other fish species.

If a suitable water level management plan is implemented, shoreline vegetation can be encouraged to grow, and productivity of the littoral zone can be improved. The following plan is submitted as a method to accomplish this goal:

1. Maximum pool should be established at 2240' msl. If, during a year of high runoff, the flood pool at 2246' is attained, then an area of vegetation will have been established just above 2240'.
2. Several years of water levels being operated in the same static range is to be avoided. If this situation occurs, it is recommended that the summer peak be eliminated every third year to promote growth of shoreline vegetation.
3. In drought years the pool should be dropped to 2225', or lower and gradually raised in 5-foot annual increments to preserve vegetation established at higher levels for future years. The raise should be terminated when maximum pool, or an elevation of 2240' is attained.
4. To accommodate spring spawning fish, it is recommended the water level rise as soon as possible (May). We realize that in some years natural mountain runoff does not occur at this time; however, water releases could be reduced in spring to facilitate flooding of shoreline vegetation at the earliest date possible. If this cannot be achieved, we recommend that the level be brought up at least by late June, or early July, to provide cover and rearing area for young-of-year fish.

MAXIMUM WATER ELEVATIONS FORT PECK RESERVOIR





ELEVATIONS

2250

2245

2240

2235

2230

2235

48

Projected
low in Feb. '88

2240'

2235'

2230'

2225'

2240'

2235'

2230'

2235'

'88

J '89

J '90

J '91

J '92

J '93

J '94

J '95

MONTH
YEAR



1988 WATER LEVEL AND DISCHARGE RECOMMENDATIONS FORT PECK RESERVOIR

RESERVOIR

The present mountain snowpack in the Missouri River Drainage above Fort Peck Reservoir is approximately 70 percent of normal, and snowpack in the surrounding lowlands is virtually nonexistent. The outlook for normal spring and early summer flows into the Reservoir, looks very poor.

The COE, February Inflow Forecast, predicts a maximum lake elevation of 2236.9' in late July, 1988. This will not provide a water level sufficient to inundate shoreline vegetation established above last year's peak elevation of 2238.5'.

Although it is apparent that 1988 spring inflow will not be adequate to raise the Fort Peck pool to the elevation of 2240', as recommended in the Long Range Water Level Operating Plan, (see attachment), it is suggested that the COE attempt to reduce inflow into Lake Sakakawea. These discharges should not be reduced below minimum flows recommended for the fishery immediately below Fort Peck, (see below), but should be diminished sufficiently to help fulfill water levels requested by the North Dakota Game and Fish Department. Ultimately, it is hoped that this strategy will not only satisfy recommendations to enhance the fishery in Lake Sakakawea, but will also provide consistency for long range water level management strategies for the entire upper Missouri River System, thereby benefitting the Fort Peck fishery as well.

MISSOURI RIVER, BELOW DAM

A minimum instantaneous discharge of 7,800 cfs, should be maintained from April 1 through September 30, to provide optimum spawning and rearing habitat for rainbow trout. The absolute minimum discharge necessary to sustain recruitment is 4,500 cfs. After September 30, a minimum instantaneous discharge should be maintained at, or above, 2,700 cfs.

If a conflict arises between meeting the desired discharges below the dam, or the recommended reservoir elevation; the reservoir should receive priority. During most years, it is assumed that both needs can be met.

NORTH DAKOTA

GENERIC MISSOURI RIVER RESERVOIR WATER LEVEL RECOMMENDATIONS

Historically, extreme changes in water levels produced the most positive impacts to the Missouri River fishery in North Dakota. Excellent overall recruitment in both reservoirs for the years 1975, 1978, 1982 and 1986 resulted from a cycle of events which temporarily altered substrate and cover types for subsequent inundation. A systematic approach to duplicate those cycles is the basic goal for operating the upper three Missouri Mainstem Reservoirs in an unbalanced mode.

Lake Sakakawea

Recent water level recommendations for Lake Sakakawea have followed a basic pattern to maximize the utilization of walleye spawning substrate. This approach, based on the need to produce a strong walleye year class, has been relatively unsuccessful. Suitable inundated spawning substrate is only one of many essential parameters needed for successful fish recruitment.

Strong recruitment has generally followed a two year drought cycle, or water levels in a given year exceeded the previous year's high water mark by four to six feet. Overall recruitment during the drought or drawdown years is generally low because spring water levels inundate less suitable spawning substrate and summer water levels can't provide the essential elements associated with inundated vegetation. Drought cycles help to improve spawning substrate, while providing an opportunity to reestablish vegetation in what will be the littoral zone during high water years.

A brief review of the fishery results associated with various water level cycles might help to explain these points. Between 1970 and 1973, yearly water level patterns were very similar. Water levels fluctuated from a low near 1837 feet msl in 1970 to a high of 1843.5 in 1973. Fishery production during this period was very unstable for a number of reasons: adverse weather conditions, draw downs during spawning-incubation (1971-72), lack of inundated vegetation, and instability in the spawning substrate. This was a period when typical northern pike spawning substrate was physically being transformed into walleye spawning substrate. The silt load was high, and shifted readily with changing wind directions. In 1974, water levels again approached 1838 feet msl for the first time in three years. Displacement of the silt load to a lower elevation (improving spawning substrate) coupled with mild weather conditions and rapidly rising water levels produced our first strong overall year class with the reservoir operated at full pool (Figure I).

Water levels in 1975 ranged from a low near 1838 feet msl to a record high of 1854.8. Further improvements to spawning substrate, a rapid spring water level rise to inundate substrate and buffer eggs during incubation, and five feet (vertical elevation) of newly flooded vegetation combined to produce the strongest fish recruitment on record.

Fish production dropped sharply in 1976. Spring water levels inundated substrate that had been degraded by high water erosion the previous year. The pool rise came late in the season, and peaked (1849 feet msl) in the absence of terrestrial vegetation. Fish production remained low as water levels continued to decline in 1977 (peak 1838 feet msl). During this drought cycle, water levels dropped to a low of 1828 feet msl in February of 1978. Declining water levels again displaced the silt load to lower elevations. This expanded and/or improved the zone of desirable spawning substrate, and provided a period for shoreline revegetation.

An early, strong rise in water levels produced excellent fish recruitment in 1978 (walleye production set an all time high) (Table 1). A number of essential parameters were addressed: early inundation of quality spawning substrate, rapidly rising water levels to buffer wind and/or temperature changes during egg incubation, and flooding of more than ten vertical feet of one and two year old vegetation which improved basic productivity and survival.

The cycle continued with declining water levels in 1979 (peak 1846 feet msl), 1980 (peak 1840 feet msl), and 1981 (peak 1836 feet msl). Fish production fluctuated based on extremes in the previously described parameters. Overall recruitment improved again in 1982 (second highest year on record for walleye production) as water levels rose sharply to inundate four vertical feet of one year old vegetation and six vertical feet of two year old vegetation. All of the basic elements representing the strong recruitment in 1978 were achieved.

Fish production in 1983 and 1984, although average years for overall recruitment, was disappointing in light of existing reservoir conditions. In 1983, water levels inundated prime walleye spawning substrate, but continued to decline throughout the early spawning season. Peak elevations inundated a limited amount of terrestrial vegetation providing some relief for later spawning species. Prime walleye spawning substrate was again inundated in 1984 and water levels rose slightly, but a late snow storm resulted in the poorest walleye recruitment on record. Peak summer elevations inundated approximately three vertical feet of well established terrestrial vegetation which was again utilized successfully by later spawning species. Water levels declined sharply in 1985 (peak 1841.5 feet msl), resulting in the lowest overall fish recruitment on record.

The excellent overall recruitment experienced in 1986 was somewhat surprising. Spring water levels inundated a minimum amount of prime spawning substrate, but then rose sharply peaking at 1848.7 feet msl. The rise occurred too late to benefit early spawners, but the high water levels did inundate approximately six vertical feet of one year old vegetation which was used effectively by later spawning species. These results placed new value on the potential of short term cycles for improving the fishery. Declining water levels in 1987 (peak 1843.6 feet msl) were again paralleled by below average fish production.

This overly simplistic review outlines some basic considerations which must be addressed in the generic or long range water level management recommendations (Unbalanced Operational Mode).

1. Maximum water level extremes (1838-1850 feet msl) must be established to develop a window within which annual recommendations can remain flexible and productive. A maximum elevation of 1838 is recommended for 1988 (Figure II) to improve spawning substrate below this elevation while developing a one year vegetation zone to 1844 and two year vegetation zone above that point. This would also help facilitate the filling of Fort Peck as recommended. Any peak elevation between 1834 and 1838 feet msl is also acceptable for 1988. Water level increases recommended for 1989 and 1990 are designed to maximize the utilization of spawning substrate and established vegetation while reflecting on recommended drawdowns for Fort Peck (anticipated construction in 1990). Recommendations beyond 1990 repeat a drawdown cycle for Lake Sakakawea while recharging the system following construction at Fort Peck.
2. The spring water level rise must inundate good spawning substrate by April 15th, and continue to rise sharply during spawning-incubation (April-May). This provides the buffer needed by early spawners. A target increase of three feet between April 15th and May 15th would ensure this goal during the filling cycle (1989-1990, Figure II).
3. Utilization of inundated terrestrial vegetation should be maximized. A target to inundate a minimum of three vertical feet of two year old vegetation should be attempted when possible. The example presented in Figure II, 1989, includes three vertical feet of two year old vegetation above the high water level in 1987, and preserves three additional vertical feet of well established vegetation for 1990. A target to inundate a minimum of six vertical feet of one year old vegetation should be attempted following a short term drawdown. Peaking each year should be short term to protect as much vegetation as possible, and promote regrowth during the drawdown. Planning should also facilitate the scheduled use of hatchery stock.
4. Static or balanced water level management will not produce a desirable fishery (1970-1973). Every attempt should be made to produce a strong year class every third year. This may require alternating long and short term drawdown cycles.
5. Project releases must be anticipated and adjusted early enough to remain uniform for endangered nesting shore birds.

Lake Oahe

The history of water level management on Lake Oahe, and the fishery results produced by that management parallel our experiences for Lake Sakakawea. Our remarks are, however, based on observations in that portion of Lake Oahe which lies within the state of North Dakota. They do not reflect the reservoir fishery as a whole.

Strong fish recruitment in 1975 followed a two year low water cycle where the reservoir elevation remained below 1610 feet msl. The rapid increase in pool levels that year inundated prime spawning substrate as well as six vertical feet of two year old vegetation and two vertical feet of new vegetation (Figure III). Water levels in 1976 and 1977 resembled those experienced in 1973 and 1974. Fish production for these low cycles ranged from average to very poor. Excellent recruitment in 1978 (walleye production set an all time high) resulted as high water levels again inundated seven vertical feet of two year old vegetation. The water levels in 1979 duplicated those for 1978, but produced only an average year class on residual vegetation.

A gradual drawdown began in 1980 (peak 1608 feet msl) and continued through 1981 (peak 1602 feet msl). Peak elevations for these years were reached in April and March respectively, and then declined through November. Limited spawning substrate coupled with declining water levels during spawning and incubation resulted in poor fish recruitment. Overall recruitment was again excellent in 1982 (peak 1613 feet msl) as constantly rising water levels inundated five vertical feet of one year old vegetation and five additional vertical feet of two year old vegetation. Water level peaks increased in 1983 (peak 1616 feet msl) and 1984 (peak 1618 feet msl), but failed to produce expected increases in fish production. A late winter storm is likely responsible for the poor fish recruitment in 1984. It is believed, however, that tributary streams in South Dakota have had a positive influence on recruitment as these year classes of walleye are now being observed as adults in North Dakota. Water levels declined in 1985 (peak 1611 feet msl). Inadequate spawning substrate and declining water levels during spawning and egg incubation resulted in the poorest year class of walleye on record. An early, rapid rise in water levels inundated seven vertical feet of one year old vegetation in 1986 (peak 1618 feet msl). Excellent fish recruitment resulted, and walleye production was second highest on record. The overall production results were similar to Lake Sakakawea which places more value on short term cycles. Fish recruitment declined in 1987 as Lake Oahe began a drawdown cycle.

Generic recommendations for Lake Oahe should address the same basic considerations needed for Lake Sakakawea.

1. Maximum water level extremes (1608-1618 feet msl) must be established to provide a degree of latitude for making annual recommendations. A maximum elevation of 1610 feet msl is requested for 1988 (Figure IV) to complete a two year drawdown cycle for revegetation. Water level recommendations beyond 1988 are based on a cycle which includes Lake Sakakawea and Fort Peck.
2. The spring water level rise must inundate spawning substrate by April 15th and continue to rise through June.
3. A target to inundate a minimum of three vertical feet of two year old vegetation should be attempted when possible. A target to inundate a minimum of four vertical feet of one year old vegetation should be attempted following a short term drawdown. Peaking each year should be short term.

4. Every attempt should be made to produce a strong year class every third year. The potential of drastic short term draw-downs should be explored.

The importance of timely water level manipulation for fish and wildlife resource management can't be overemphasized, nor can the destructive capacity of untimely manipulation be underestimated. Information gained from thirty years of Missouri River investigations now outline the methods and importance of a System Approach to water level management as a tool to enhance fish and wildlife resources. Every attempt should be made to develop workable water level scenarios which will promote those objectives on a more frequent basis. The Unbalanced Operational Mode must be pursued to the fullest if any degree of stability is to be expected from those resources.

Basic generic recommendations as presented place Lake Sakakawea as priority 1, Lake Oahe as priority 2 and Garrison Dam releases as priority 3. Lake Sakakawea has experienced only one strong walleye year class (1982) since 1979. As our ability to revive this fishery through natural reproduction diminishes, the need to capitalize on existing brood stock potential becomes more important. Stocking as a supplement has proven effective in limited areas, but it cannot replace natural reproduction.

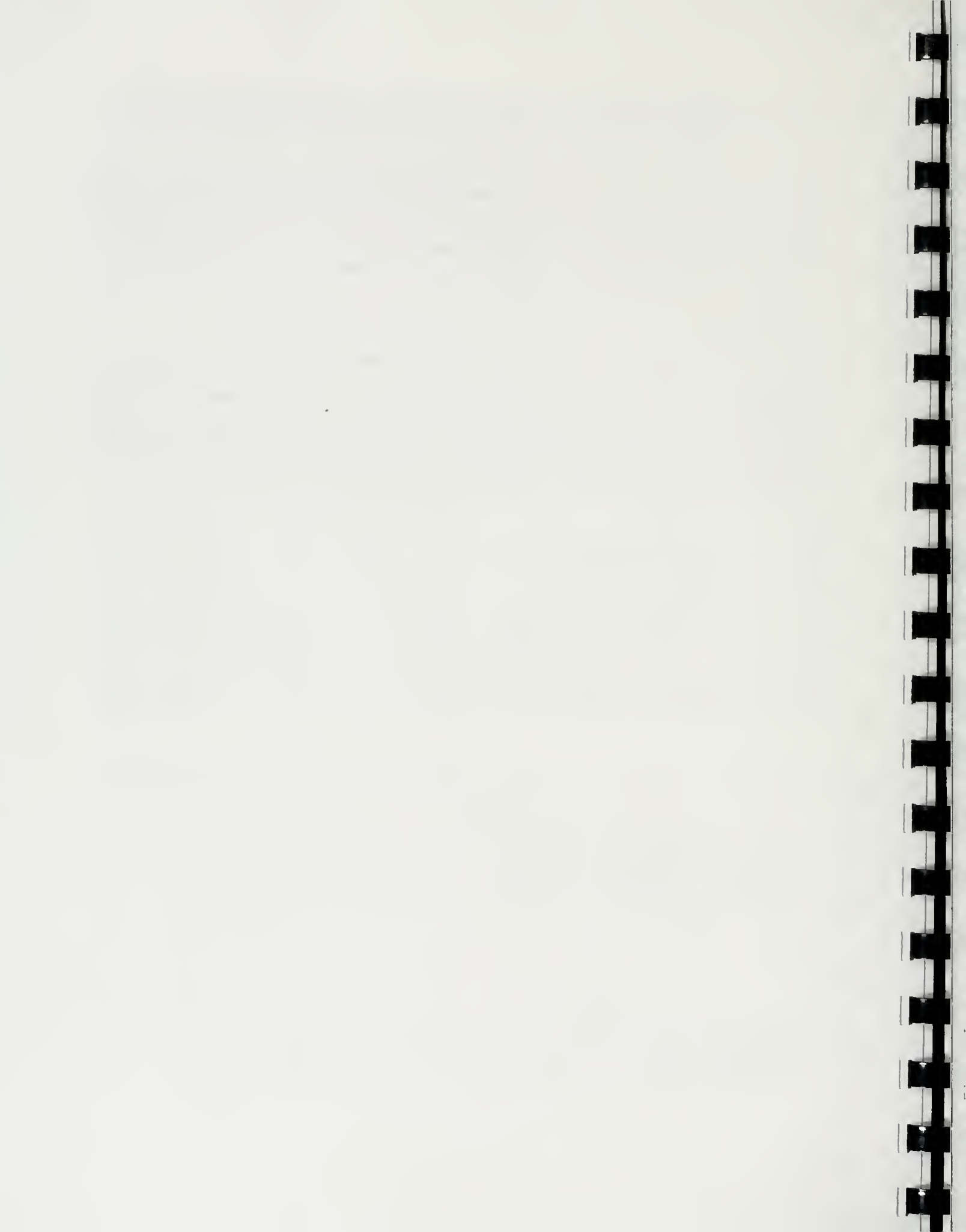
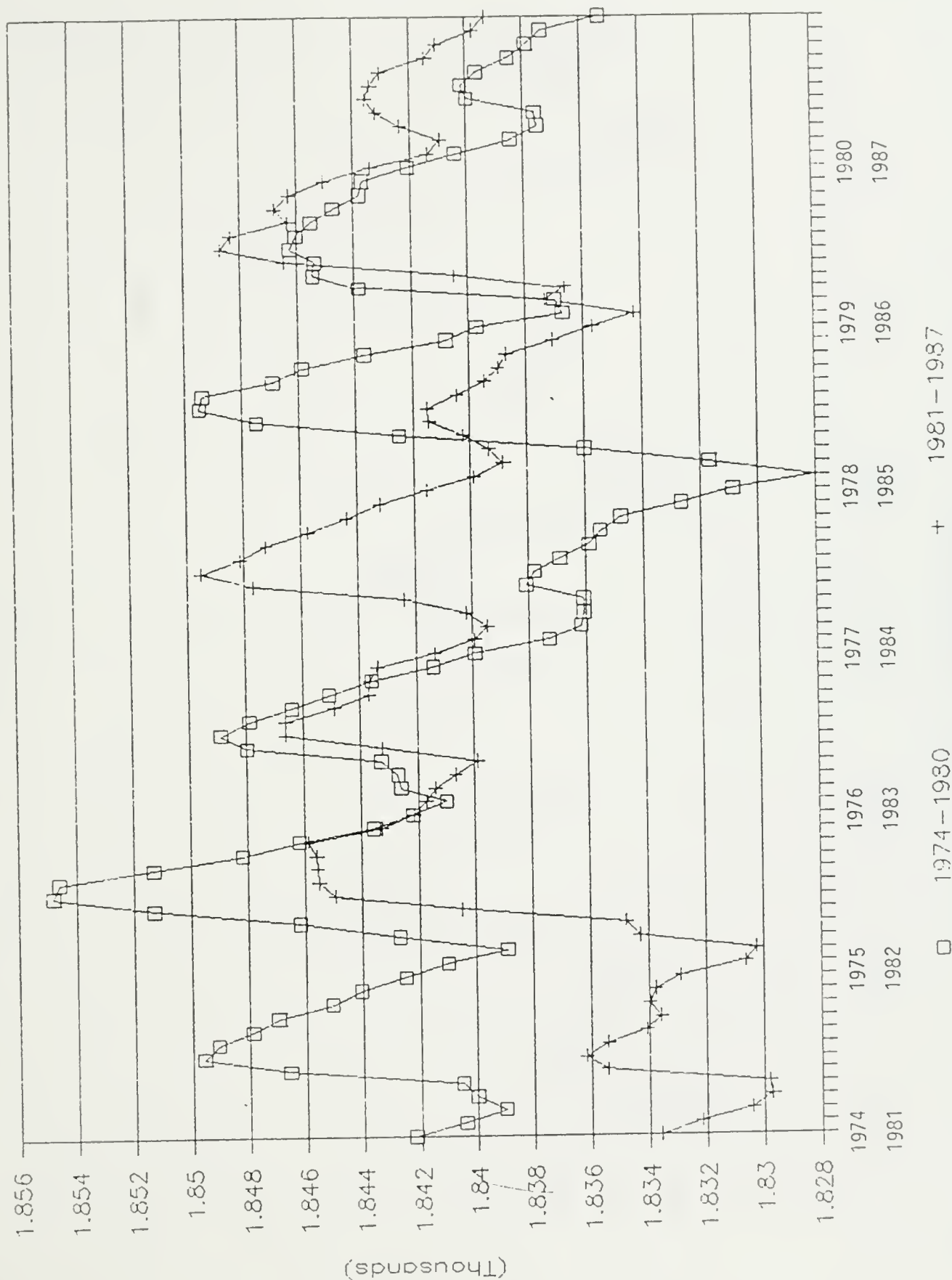


Figure 1.

LAKE SAK. LEVELS, 1974-1980, 1981-1987

FT. M.S.L.



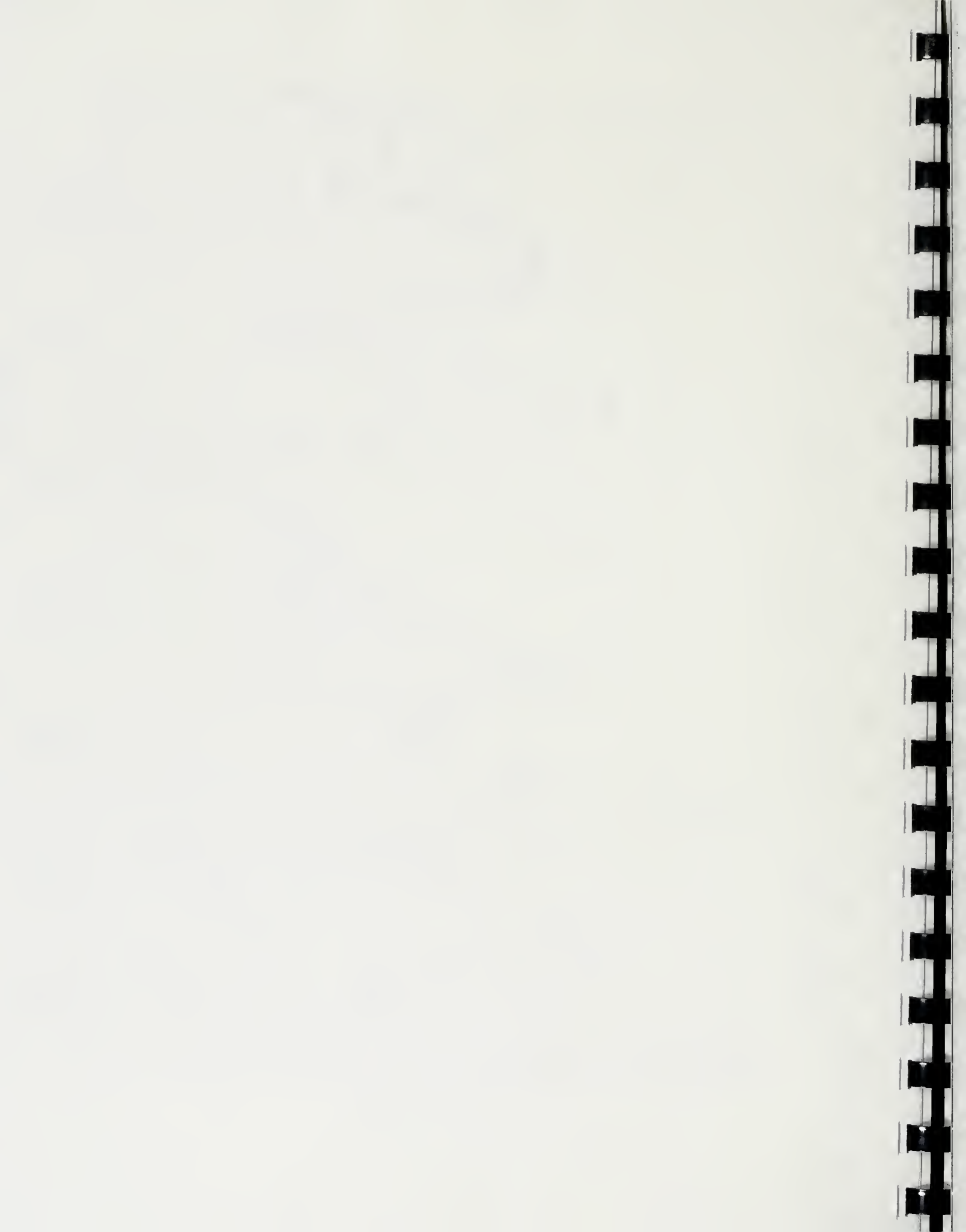


Figure II.

LAKE SAKAKAWEA LEVELS, 1988-1994

FT. M.S.L.

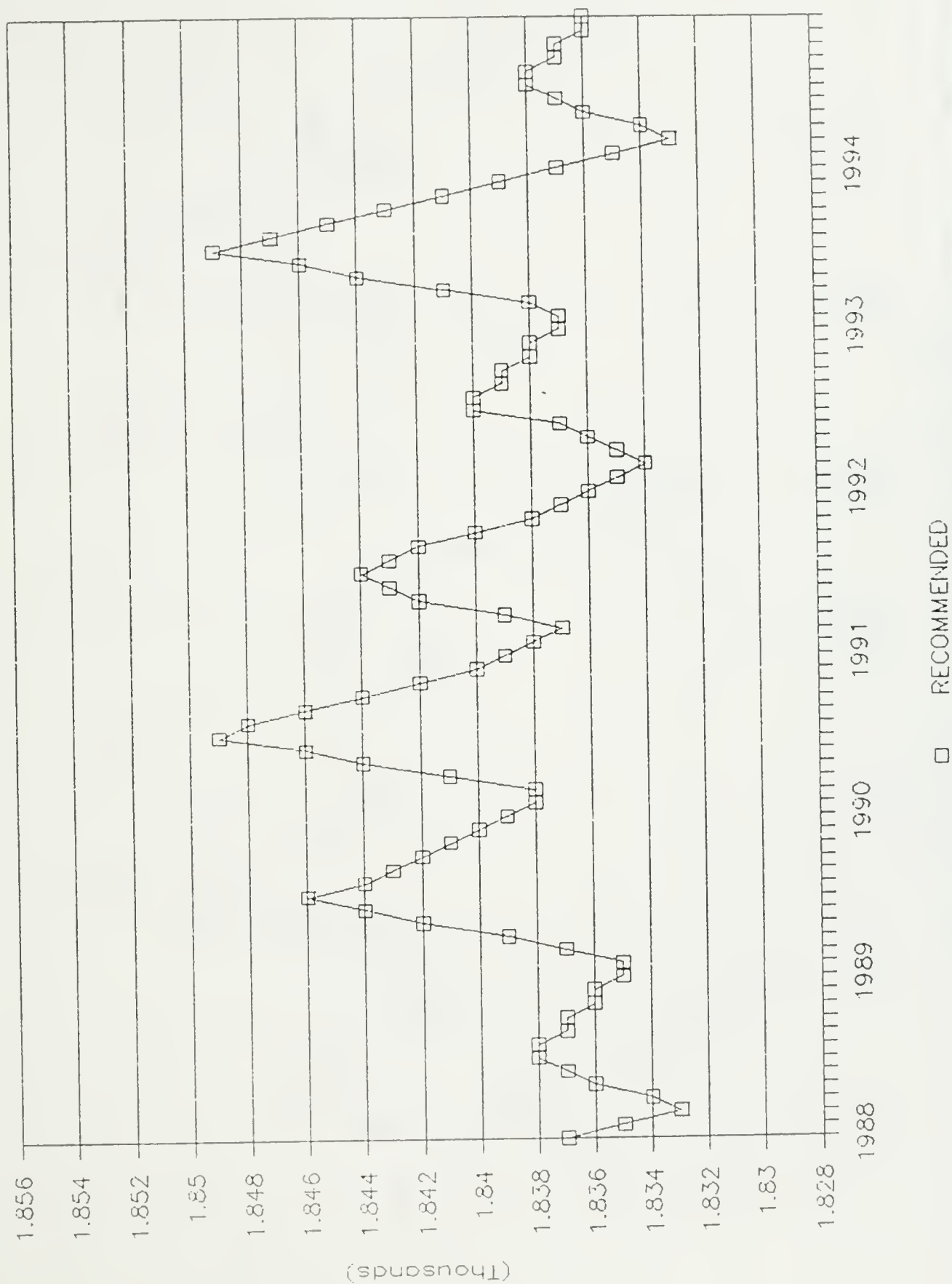




Figure III.

LAKE OAHE LEVELS, 1974-1980, 1981-1987

FT. M.S.L.

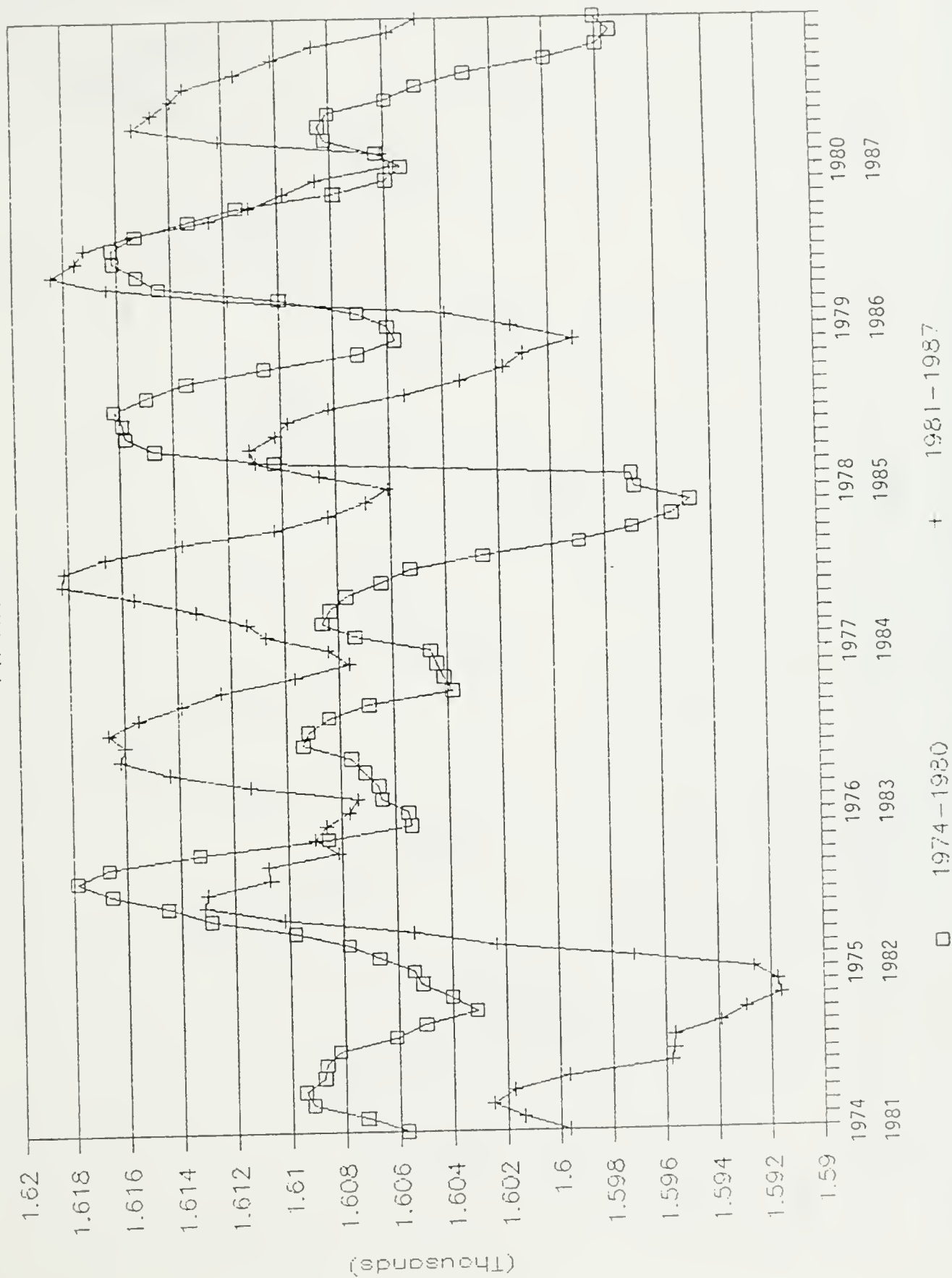
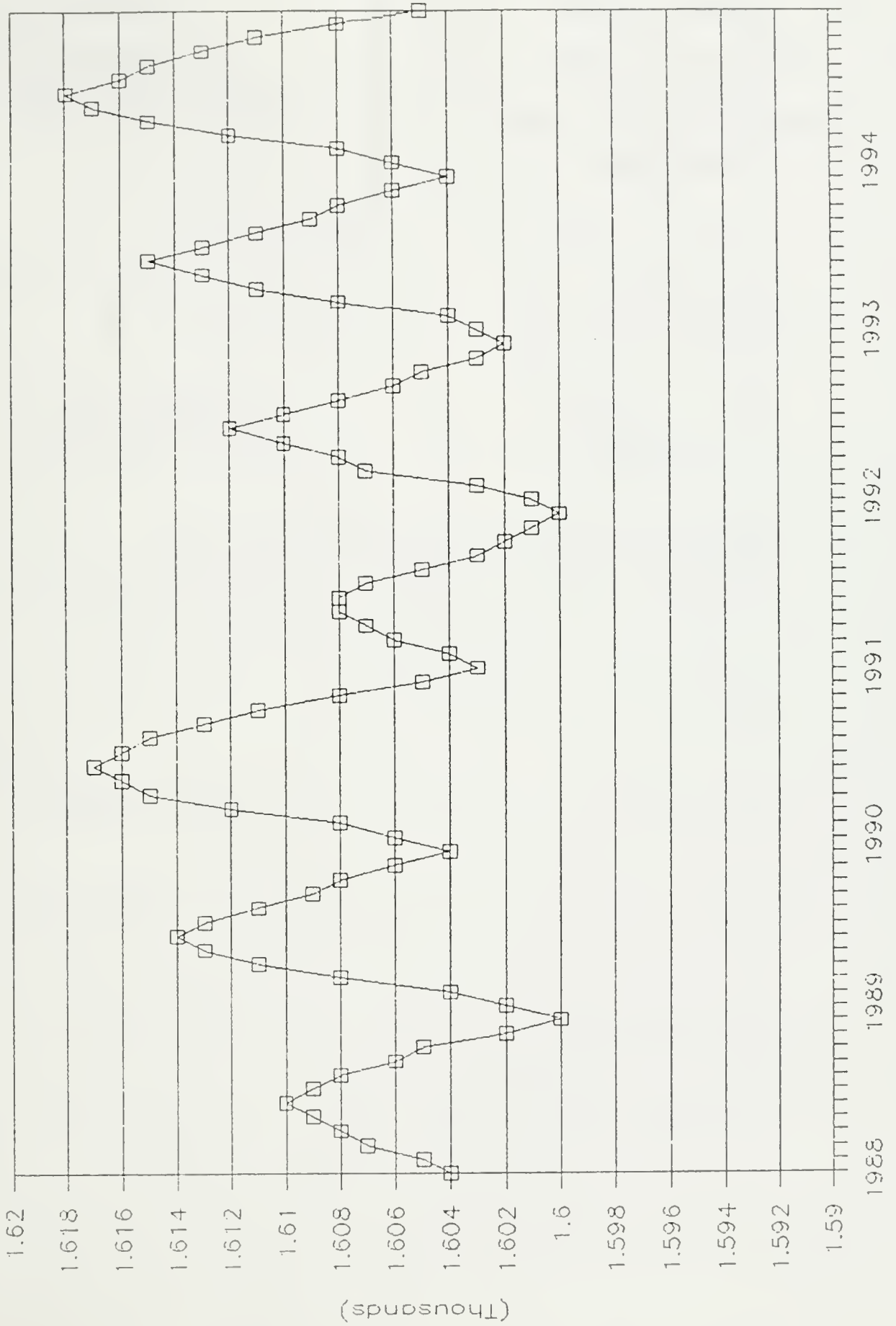




Figure IV.

LAKE OAHE LEVELS, 1988-1994

FT. M.S.L.





South Dakota
Department of
Game, Fish and Parks

Division of Wildlife
Sigurd Anderson Building
445 East Capitol
Pierre, South Dakota 57501-3185
(605) 773-3381

September 21, 1988

Duane Sveum
Reservoir Control Center
U.S. Army Corps of Engineers
P.O. Box 103, Downtown Station
Omaha, NE 68101



Dear Duane,

Enclosed is our 1988 response and brief ideas for 1989. We will provide final comments following your public meeting if we feel our fall data warrants inclusion.

Feel free to contact us if you have any questions.

Sincerely,

A handwritten signature in dark ink, appearing to read "Dennis".

Dennis Unkenholz
Division Staff Specialist

DU:jljg

cc: Kent Keenlyne

Lake Oahe (South Dakota Portion)

Water levels remained below 1,608 from April through July and may recede to 1,587 by the end of 1988. This operation for 1988 meets the objective of providing for shoreline revegetation above 1,605 which can be flooded in subsequent years to enhance fish spawning and rearing. Little vegetation was present below elevation 1,617 at the end of 1987. Some revegetation is apparent at elevations above 1,605, especially in areas where livestock have been fenced out.

The Game, Fish and Parks (GF&P) reservoir staff and the Corps rangers cooperated on a project to seed some of the Oahe flats. The Corps purchased orchard wheat, annual rye and reed canary grass seed and GF&P chartered aerial seeding of Foster Bay and Sully Flats.

Due to the consistently dropping water levels in Lake Oahe, fish reproduction was very poor during the spring of 1988. Species that experienced successful reproduction were white bass, yellow perch, freshwater drum and smelt.

Sport fishing on Oahe has been excellent during 1988. Salmon harvest during 1988 will exceed the 1987 harvest of 15,000 fish. Creel survey results indicate the 1988 salmon harvest will be over 30,000 fish. Growth of salmon is down slightly from past year and netting results show a decline in the number of smelt larger than about four inches.

Anglers can expect catch rates to level off or even decline in 1989. Data suggests that young salmon under four pounds can prey on small smelt and maintain good growth, but older fish need large forage to maintain feeding efficiency. Large salmon cannot catch numerous small smelt efficiently enough to maintain good growth.

Walleye fishing has been excellent the entire summer. success has been described by many to be as good as success during the 1981-82 season when over 300,000 walleyes were harvested. Many young walleyes have been caught in areas where walleye fingerlings have been stocked during recent years. This management scheme is important during years when natural reproduction is predicted to be low. In lower Oahe the walleye harvest is exceeding 25,000 fish this year compared to 10,000 in 1983.

The operation of Whitlocks Spawning and Imprinting Station was again successful in 1987. The fall operation of the facility began September 11 and continued through November 15. The first adult chinook ascended the ladder September 18. The spawning run peaked on October 27.

The following list provides statistics of operation for the fall of 1987:

Total salmon returned	1,034
Female salmon spawned	187
Salmon eggs collected	871,000
Brown trout fingerlings imprinted & released	93,700
Adult brown trout returned	87
Brown trout eggs collected	84,600
Public visitors	2,700

Spring Creek Subimpoundment, approximately 10 miles north of Oahe Dam, was used to rear northern pike fingerlings on shoreline vegetation. In June, ten thousand 4-inch fingerlings were harvested and stocked into Spring Creek Bay. Due to low local runoff we pumped the impoundment full which allowed production to occur.

More than one million salmon smolts were stocked in Lake Oahe in 1988. Most were introduced at Whitlocks Bay because adults return better to the spawning facility if stocked there as smolts. Several test groups were tagged with coded wire tags to evaluate survival of smolts stocked at different dates and sizes.

A record number of walleye eggs were collected this spring as well as in record time. Over 160 million eggs in 14 days. Weather was pleasant, a welcome break from normal spawning seasons which are cold and windy.

Water level recommendations for Lake Oahe in 1989 are to have a rising water level during April through June and the peak elevation should not exceed 1,606. This would allow vegetation to be flooded providing spawning habitat and a release of nutrients from the decomposing vegetation. Nutrient inflow during low water years when little or no plains run-off occurs is minimal. Flooded regrown shoreline vegetation may be the major source of nutrients if allowed to flood during a low water year.

Vegetation regrowth above elevation 1,606 would be favored during 1989 and utilized during subsequent years and, if possible, over several years.

Lake Sharpe (Big Bend Reservoir)

Lake Sharpe water levels are relatively stable by design which allows for annual reproductive success. Walleye reproduction during the spring of 1988 was excellent. Population sampling of adult walleye also documented near record levels in 1988. Spawning usually occurs two weeks later in Lake Sharpe than in the other reservoirs. This year the walleye spawned in April because the weather patterns were generally warmer and more stable.

Fishing success on Lake Sharpe has also been excellent in 1988. The following tables demonstrate that this year is the best in recent years. Fall fishing in the Oahe tailwaters attracts many anglers and is expected to continue. Good catches of rainbow and brown trout, salmon and walleyes are taken throughout the year from the Oahe Tailwaters.

Oahe Tailwaters - 1988 Creel Survey

	Fishing Pressure (Angler hours)	Walleyes	Sauger	White Bass	Salmon	Trout	Catch Rate
April	21,050	4,067	-	284	189	851	.26
May	27,087	6,419	145	13,851	121	48	.76
June	17,508	3,184	34	3,797	528	17	.43
July	18,889	2,009	-	40	201	121	.13
August	20,383	9,062	-	562	211	632	.51
Total	104,917	24,741	179	18,534	1,250	1,669	

Angler Days = 41,827

Mean Trip Length = 2.5 hours

Oahe Tailrace (Dam to End of LaFramboise) compared to past years

<u>Fishing Pressure</u>		<u>Angler Days</u>	<u>Harvest</u>		
			<u>Trout</u>	<u>Walleye</u>	<u>Salmon</u>
1988	104,917 hours	41,827	1,669	24,741	1,250
1987	130,044 hours	34,810	3,000	15,831	478
1985	134,030 hours	28,517	325	15,980	414
1984	104,309 hours	23,706	390	21,549	234

Oahe releases into Lake Sharpe have been higher because of the drought. Increased flow on weekends positively affected angler success. The Bad River broke tradition and did not live up to its name in 1988. There was virtually no runoff during the dry spring. Therefore, walleyes remained in upper Lake Sharpe all spring and summer which resulted in increased recreational opportunity and angler success.

Fish stocked in Lake Sharpe during 1988 include: smallmouth bass, muskellunge, rainbow trout and brown trout.

No change in water level management is recommended for Lake Sharpe in 1989.

Lake Francis Case (Ft. Randall Reservoir)

Spring water elevations in Lake Francis Case were stable to slightly rising during the April-May period. Early and rapid spring warming resulted in peak walleye spawning activity occurring about one week earlier than normal. Good water elevation and spring warming, coupled with below normal local precipitation and periods of high wind resulted in walleye recruitment for 1988 being "fair to average".

Young-of-year fish survey work indicates that reproduction for most species during 1988 is below the norm, although all major sport and forage fish species were collected. Growth rates of walleye are reflecting the decreased biomass of forage fishes over the past two years. Natural reproduction of smallmouth bass was documented at several locations.

Collection of paddlefish brood stock was accomplished near the mouth of the White River during mid-May. Twenty-seven fish were collected, with 11 fish being transferred to American Creek Fisheries Station for spawning. Three females were spawned, resulting in an egg take of approximately 1,500,000. Eggs were "eyed up" at American Creek and subsequently transferred to Cavins Point National Fish Hatchery for hatching and pond culture. Hatching success was excellent.

Sport fishing success on Lake Francis Case during the fall 1987 through early summer 1988 period was good. The extremely hot summer limited the fishing activity during July and August. Walleye dominate the sport fishery, with high catch rates, but the average size fish being only about a pound. Efforts at promoting a more conservative walleye harvest in 1989 are being prepared to work at moving the walleye to a larger average size. Smallmouth bass stocking efforts are showing good success, with this species becoming more common in the creel.

Fish stockings during 1988 for Lake Francis Case include: northern pike, smallmouth bass, walleye, paddlefish and brown trout.

Water level management recommendations for 1989 will again include stable to rising elevation during the period mid-April through mid-May. A reservoir elevation of at least 1,356 during early to mid-May also greatly aids work efforts in collecting paddlefish brood stock.

Lewis and Clark Lake (Cavins Point Reservoir)

Water level patterns for Lewis and Clark followed their routine cycle. Releases from Ft. Randall Dam during April and May were conducive for fish reproduction. Young-of-year sampling for 1988 shows good reproduction of walleye, smallmouth bass and paddlefish. White bass, largemouth bass and white crappie were also collected. Emerald shiner and gizzard shad showed a decline over last year. Projects to enhance and improve fish habitat and recruitment such as re-opening of closed bays and backwaters and construction of in-lake reefs and piers would undoubtedly have a positive influence on fish recruitment and angler success.

Sport fishing success on Lewis and Clark Lake was fair during 1988 and good in the river up to Ft. Randall Dam. Small and largemouth bass fishing in the river has developed into an important component of the fishery and is drawing national attention. The Northern Divisional (8 states) B.A.S.S. tournament was held on Lewis and Clark in May. Tournament anglers were impressed with good fishing success and the quality facilities. The success of this tournament and other smaller ones will continue to attract anglers to this area.

Spring water releases from Ft. Randall Dam during 1989 will again be important for successful fish reproduction. Stable and increasing flows with a minimum of daily peaking are critical during the April and May period.

Gavins Point Tailwaters

Decline in habitat resulting from channel degradation remains a major fisheries concern. Virtual elimination of backwater and side channel habitat, along with reduction in sand bar habitat continues to negatively impact fisheries. Indicator species, such as paddlefish, show a gradual decline in abundance. State and Federal agencies involved in management activities on this river reach need to continue to address this problem.

Missouri River water manipulation is one of the major options available for fisheries, wildlife and recreational management in South Dakota. Information gathered over the years has shown water levels and vegetation regrowth are critical to successful fish reproduction and recruitment on these large reservoirs. Research also indicates that the timing and amount of released water are limiting factors for least tern and piping plover populations. A system-wide approach to water management is supported by South Dakota.

Water level scenarios for each of South Dakota's mainstem reservoirs are somewhat different. General plans are, therefore, presented by reservoir and tailwater reaches. These plans also reflect water level management that is compatible with park use and tern/plover habitat needs.

The following general plans are unique to each respective reservoir and tailwaters:

Lake Oahe

The nature of Oahe Reservoir allows several water management cycles, those being: seasonal, annual, and over several years. A general request over years would allow for a two year period of water levels that do not exceed the base of flood control. This allows a minimum of two growing seasons for shoreline vegetation re-growth. Following the low period, reservoir elevations would be allowed to inundate re-vegetated shoreline in annual increments; thus, utilizing the vegetation over several years rather than all in one year. Fish reproduction and recruitment have been excellent when reservoir elevations follow that general cycle over years.

Annually, water levels should rise from early spring until summer, be held stable for the summer, and then be allowed to decrease gradually during late summer and fall. This scheme should begin with elevation about 1,605 ft in early spring.

Water may be manipulated seasonally by allowing a faster or slower rise in the spring and hold or release water in other reservoirs. This could be used to maximize benefits of shoreline vegetation, water temperatures or the chronology of spawning fish. For example, species could benefit by designing water levels for the appropriate spawning time related to vegetative conditions.

Extremes to avoid on Oahe Reservoir would be: elevations below 1602 ft which makes boat ramps unusable; elevations above 1617 ft which causes great amounts of shoreline erosion; and decreasing water levels during spring spawning.

Oahe Tailwaters

Tailwater releases should not drop below 10,000 cfs on weekends during April through September. This would enhance use by the public and stabilize aquatic habitat in the river from the dam to the upper end of Lake Sharpe and potentially prevent ice jams during the winter.

The aquatic habitat is diminished in the river below Oahe Dam when low flows exist. This displaces fish and other aquatic animals and thus impacts the stability of the aquatic community in this valuable river reach.

Stable releases are needed during spring spawning and fishing season. High releases are needed during periods of high turbid flows from the Bad River to flush sediment downstream. Watershed management should be planned in the Bad River drainage to minimize sediment loads from the Bad River.

Any dredging activities in this area should be designed to build artificial nesting structures for terns and plovers. Efforts could be made to concentrate dredge spoils which have been used by both species as nesting habitat in other states.

We need to study the problems associated with winter ice jams and reduced flows from Oahe. The larger question of aggradation should be addressed and the impact that it has had and will have on future flows during all times of the year should be defined. The Pierre/Ft. Pierre study has addressed the question of ice damming from a power production viewpoint. The problem needs to be viewed from a biological/recreational viewpoint as well.

Lake Sharpe

Due to the usual stable operation of Lake Sharpe, the current Corps of Engineers operating plans for that reservoir meet fisheries needs. The sport fishery in Lake Sharpe appears to be the most stable walleye fishery of the four reservoirs because of water management of the reservoir.

Weekend elevation fluctuations greater than 2 feet should be avoided. This affects access at Farm Island and West Bend. Lake elevation should be held greater than 1419.5 ft.

Big Bend Dam Tailwaters

An instantaneous release of 10,000 cfs is needed to stabilize fishing over the weekend and minimize effects of fluctuating water levels on fish. As with the Oahe tailwaters area, any dredging activities could be used to create artificial nesting habitat for terns and plovers. Historic data indicates this area was used during the 1970's by nesting least terns.

Releases of 10,000 cfs or greater are recommended unless make up water from the emergency spillway produces a 10,000 cfs minimum.

Lake Francis Case

Stable to rising water elevations from mid-April to mid-June when fish spawning is mostly complete. Shoreline vegetation is in short supply on Lake Francis Case and two growing seasons are necessary to produce good re-growth that will be useable by spawning fish. Normal fall drawdown severely limits littoral zone production of bottom organisms, which are important fish food items. Any reduction in the amount of fall drawdown would benefit benthic production and in turn provide a boost to the fishery.

Any decrease in water elevation from mid-April through mid-June should be avoided. The relation of reservoir volume to Ft. Randall releases means small changes in inflows or outflows may cause significant elevation changes during prime spawning times. Elevations greater than 1360 ft will cause damage to boat ramps, park facilities, fisheries facilities and increase shoreline erosion.

Elevations below 1353 ft during the recreational season of Memorial Day to Labor Day are undesirable. Elevations less than 1345 ft makes most boat ramps unusable.

Fort Randall Tailwaters

The traditional request for stable releases of 20,000 cfs were requested for Fort Randall Dam. This allowed adequate flows to provide suitable spawning habitat in the river to Lewis and Clark Lake. Riverbed degradation and sandbar movements have decreased the effect of 20,000 cfs flows on the spawning habitat. Spawning substrate is at an elevation that requires 25,000 cfs to inundate suitable spawning habitat. These releases should be maintained into June.

Sport fishing is enhanced by flows greater than 20,000 cfs by providing good access to the river, stable flows, and minimized effects resulting from peaking. Low angler use, for example, was documented during 1984 through 1986 due to extremely low releases from Fort Randall Dam during the spring.

Of special concern in this region and the Gavins Point tailwaters section are the high concentrations of nesting terns and plovers. Releases should be coordinated to concentrate birds on suitable habitat and maintain safe habitat during the critical June and July portions of their nesting season. High water releases (35,000 cfs or higher) during the fall or winter could be used to scour existing sandbars thereby removing vegetation in addition to creating high profile sandbars. Water level management that would facilitate least tern production should be appropriate for fisheries needs as well. Flows less than 20,000 cfs during the spring period and flows less than 10,000 cfs the remainder of the year should be avoided. Water could be released from spillway to supplement flows during plant inspections. In-stream flow studies are needed to address critical life stages and associated habitat needs of existing fish populations.

Lewis and Clark Lake

Due to physical characteristics of Lewis and Clark Lake, little shoreline or aquatic vegetation exists. The few small bays that occur have been closed to the reservoir by wave and sediment action. The reservoir should be held slightly higher in the spring and slightly lower in the summer and fall so that a more normal lake-like pool is maintained through the entire year and avoid winter drawdown to 1,204 ft. Reclamation of bays should be planned to increase shoreline development and provide additional habitat.

Elevations of 1208 ft or greater should be avoided because of extreme shoreline erosion that occurs. Shoreline damage occurs along the parks and causes damage to development areas. Shoreline vegetation would aid spawning and nursery areas.

Gavins Point Tailwaters/Lower Missouri River

The natural river portion from Gavins Point Dam to Ponca, Nebraska, harbors critically important nesting habitat for terns and plovers. We strongly suggest that a coordinated plan be developed to provide safe nesting habitat, protection from human disturbance and continued funding for needed research concerning interior least terns and piping plovers. The suggestions for the Fort Randall tailwaters would also apply to the section below Gavins Point Dam. Releases from Gavins Point traditionally are stable and we support that operating plan. We do

question the need for annual de-watering for inspection because of its effect on attached organisms. If other inspection methods such as the use of divers or cameras are available, we would support that rather than de-watering. We appreciate the 1985 inspection method of maintaining adequate flows by releasing water from the spillway.

Figure III.

LAKE OAHE LEVELS, 1974-1980, 1981-1987

FT. M.S.L.

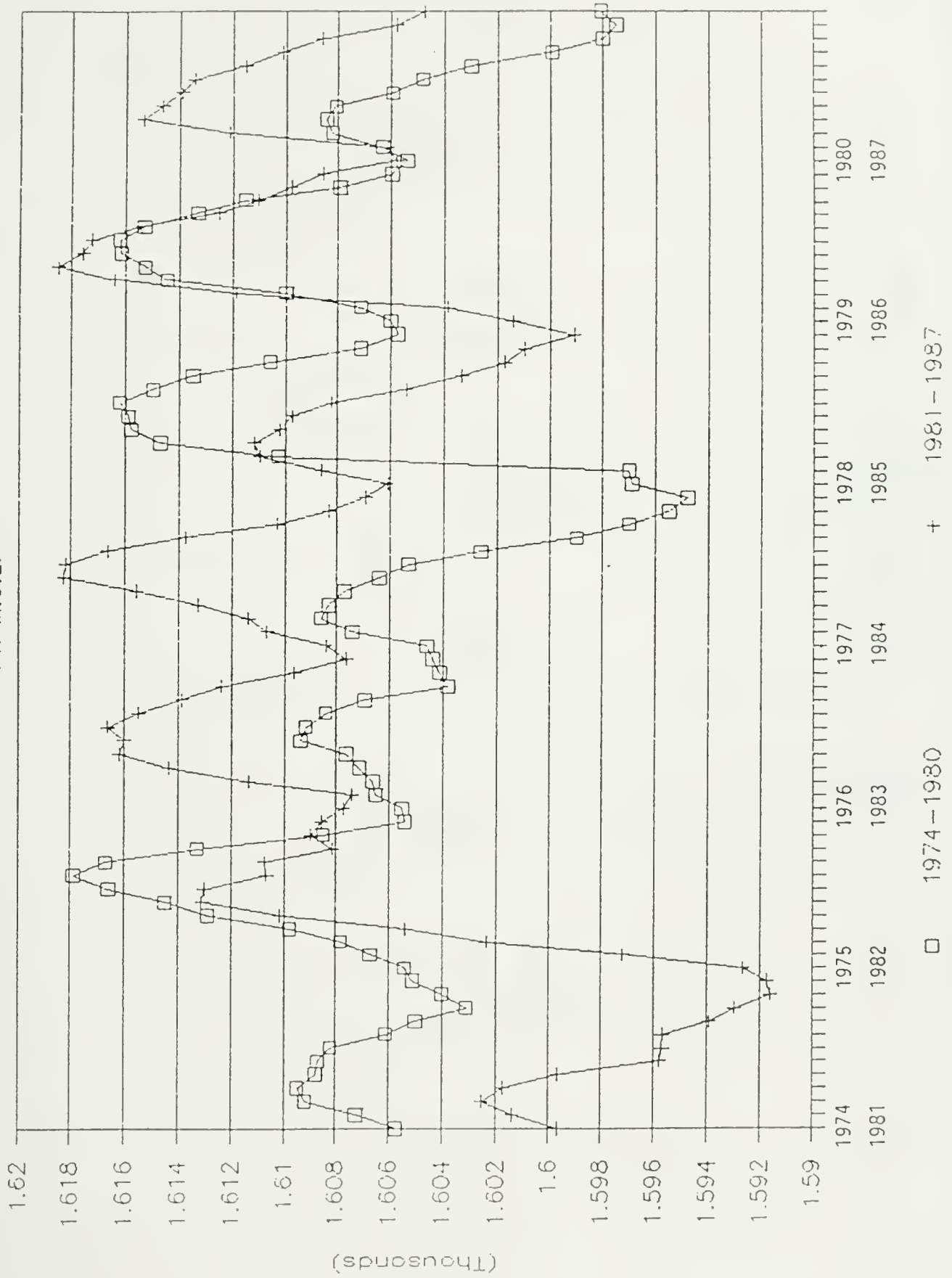
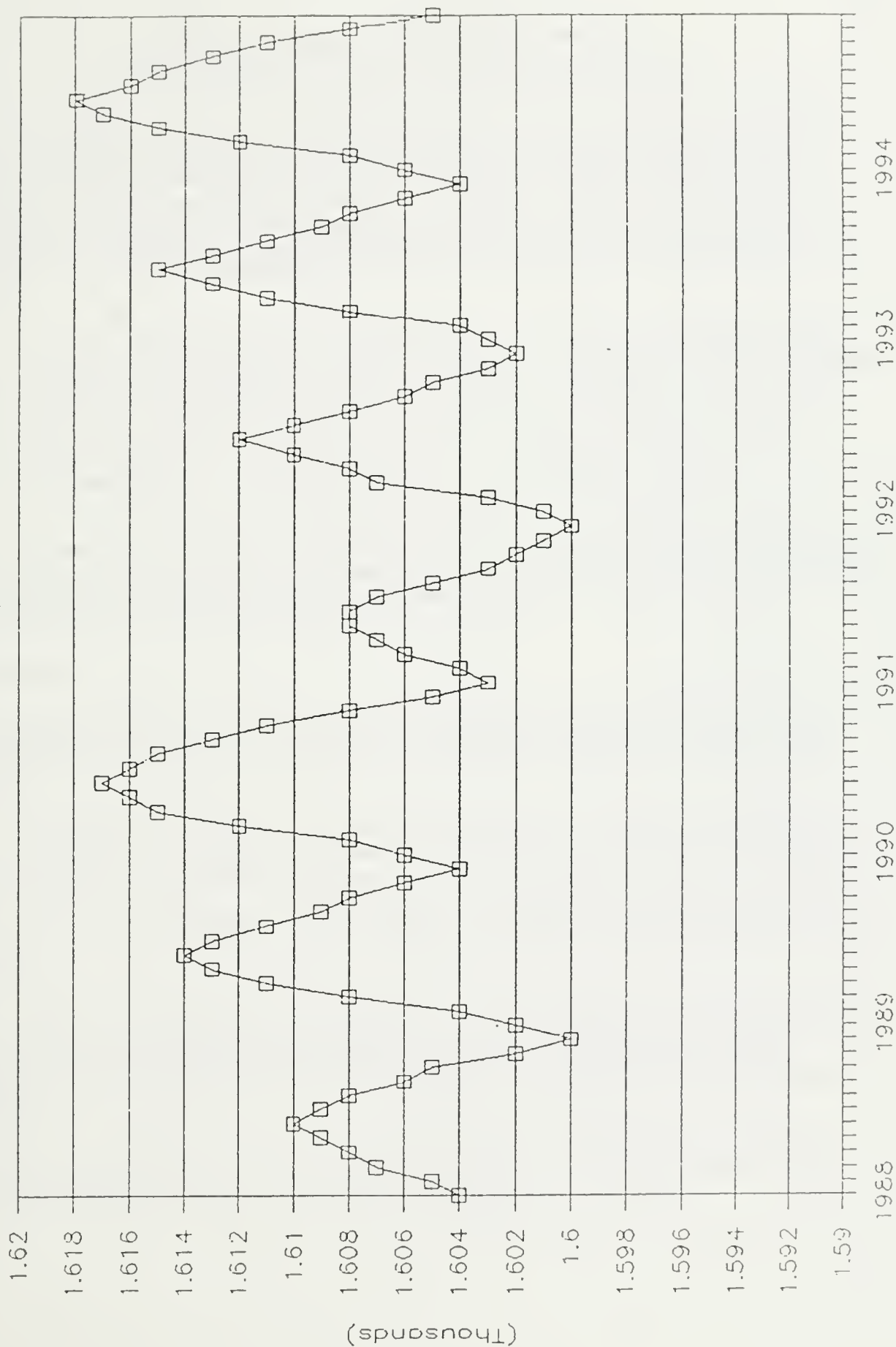


Figure IV.

LAKE OAHU LEVELS, 1988-1994

FT. M.S.L.



1988 South Dakota Missouri River Reservoir
Water Levels and Tailwater Release Recommendations

Natural cycles of dry and wet conditions that yields below and above average values in the Missouri River basin are important to fish production. The first high water year following a two year low in reservoir water levels produces a large year class of nearly all species. Historically water, level recommendations have been developed to compensate for any unfavorable conditions. Management of the unbalanced system may provide flexibility to develop a scenario of water levels to produce good fish production once out of 3 years.

As with our fisheries resources, recommendations involving endangered least terns and threatened piping plovers should also be considered. To assist with your planning we have enclosed a section of Monica Schwalbach's draft thesis which provides management guidelines. In addition, if the entire recommendation package is followed, we see no conflicts between fisheries goals and management of terns and plovers. We have also included tern and plover recommendations in the generalized water management section.

Water level requests will be presented by reservoir or tailwater reach. A generalized water plan for the Missouri River is attached. That plan explains the rationale for management recommendations and extremes to avoid. The 1988 recommendations follow the generalized water management plan but inject elevations and needs appropriate for this season.

Lake Oahe

Water level requests for Oahe are to hold maximum elevation below 1609. No vegetation exists below 1618 elevation. Extremely high water levels in 1987 precluded any vegetation re-growth as the reservoir filled to approximately 1618.

The total absence of shoreline vegetation negates any reasonable amount of northern pike reproduction or reproduction of species that require vegetation to be successful. Northern pike have not had a successful spawn since 1982.

Plans are to grow vegetation above 1609, to recommend the 1989 elevation not exceed 1609, and then plan a rise in 1990 that would inundate vegetation above 1609.

The scenario of providing two years of low levels followed by a high year to flood re-grown vegetation and produce a strong year class of fish one year out of three has occurred naturally. This same water level regime could be manipulated artificially by using the storage flexibility in the unbalanced system.

No special elevations are required during 1988 for construction of projects. Fall elevations below 1596 would allow extension of boat ramps and the fish ladder at Whitlocks but are not formally requested.

Oahe Tailwaters

Tailwater releases should not drop below 10,000 cfs on weekends during April - September. This would enhance use by the public and stabilize aquatic habitat in the river from the dam to the upper end of Lake Sharpe and potentially prevent ice jams during the winter.

Habitat in the river below Oahe Dam becomes unusable by aquatic organisms when low flows exist. This displaces fish and other aquatic animals and thus impacts stability of the aquatic community in this valuable river reach.

Lake Sharpe

Due to the usual stable operation of Lake Sharpe, we offer no changes to current operating plans for that reservoir. The sport fishery in Lake Sharpe appears to be the most stable walleye fishery of the four reservoirs.

Big Bend Dam Tailwaters

Maintain an instantaneous release of 10,000 cfs to stabilize fishing over the weekend and minimize affect of fluctuating water levels on fish.

Lake Francis Case

A stable to rising reservoir elevation, which approaches elevation 1356 by mid-April, and then remains stable to slightly rising until early June appears to be one important factor for successful walleye spawning in Lake Francis Case. As documented in COE funded work by Michaletz (1985) small drops in reservoir elevation will have significant impacts on incubating eggs. Walleye egg incubation generally commences in mid-April and hatch usually will conclude by the third week in May. Communication from the COE the past two springs regarding timing of decreases in reservoir elevations has been greatly appreciated and has undoubtedly played a role in the successful walleye reproduction observed during 1986 and 1987. Maintaining elevation 1356 until June is also important to provide enough water depth in the area of the reservoir near the White River where paddlefish brood stock are collected, as well as aiding reproduction of species such as yellow perch, emerald shiners, crappies and white bass.

Shoreline vegetation is nonexistent in Lake Francis Case. Reduction of reservoir elevation to 1354 by July 1 will allow a major portion of the growing season for shoreline revegetation. Northern pike, a species which needs flooded terrestrial vegetation to spawn, is desired by anglers coming to LFC and at one time was an important sport fish in this reservoir. Recent work by the SDGF&P to reestablish this species through a hatchery stocking program and subimpoundment system, has now appeared to increase northern pike population levels to a point that sufficient numbers of mature fish should exist during 1988 and 1989 to spawn naturally, should suitable habitat conditions exist.

A delay of the fall drawdown by one month is requested to facilitate fall boating and fishing. Nearly all boat ramps become unusable following the fall drawdown.

Fort Randall Tailwaters

Stable or increasing instantaneous releases of 20,000 cfs minimum from mid-April through June are requested for Ft. Randall Dam. This would allow adequate flows to provide suitable spawning habitat in the river to Lewis and Clark Lake. Riverbed degradation and sandbar movements have decreased the effect of 15,000 cfs flows on the walleye, sauger and paddlefish spawning habitat. Spawning substrate is at an elevation that requires 20,000 cfs to inundate suitable habitat.

Sport fishing is enhanced by flows greater than 20,000 cfs by providing good access to the river, stable flows, and minimized effects resulting from peaking. Low angler use was documented during 1984 - 1986 due to extremely low releases from Ft. Randall Dam during the spring. However, angling below Ft. Randall was greatly improved in 1987, in part due to more suitable water conditions below the dam.

Lewis and Clark Lake

Due to physical characteristics of Lewis and Clark Lake, little shoreline or aquatic vegetation exists. The few small bays that occur have been closed to the reservoir by wave and sediment action. The reservoir should be held slightly higher in the spring and slightly lower in the summer and fall so that a more normal lake-like pool is maintained through the entire year.

Gavins Point Tailwaters/Lower Missouri River

Fisheries suggestions for the Ft. Randall tailwaters would also apply to the section below Gavins Point Dam. Releases from Gavins Point traditionally are stable and we support that operating plan. We do question the need for annual de-watering for inspection because of its effect on attached organisms. If other inspection methods such as the use of divers or cameras are available, we would support that rather than de-watering. We appreciate the 1985 inspection method of maintaining adequate flows by releasing water from the spillway.

The following list describes the species, numbers and location of fish stocking for the South Dakota portion of the Missouri River:

PLANNED 1988 FISH STOCKINGS

Oahe Reservoir

Walleye	477,000 Fgl.
Smallmouth Bass	150,000 Fgl.
Chinook Salmon	1,000,000 Fgl.
Steelhead Trout	50,000 Ylg.
Brown Trout	75,000 Ylg.

Spring Creek Subimpoundment

Northern Pike	90 Prespawners
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Lake Sharpe/Oahe Tailwaters

Tiger Musky	50,000 Fgl.
Paddlefish	25,000 Fgl.
Bluegill	250,000 Fgl.
Largemouth Bass	50,000 Fgl.

Oahe Subimpoundment

Smallmouth Bass	50,000 Fgl.
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Lake Francis Case/Big Bend Tailwaters

Walleye	250,000 Fgl.
Northern Pike	200,000 Fgl.
Paddlefish	25,000 Fgl.
White Crappie	250,000 Fgl.
Smallmouth Bass	125,000 Fgl.
Brown Trout	50,000 Ylg.

Platte Creek Subimpoundment

Northern Pike	60 prespawners
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Lewis and Clark/Ft. Randall Tailwaters

Walleye	250,000 Fgl.
Musky	50,000 Fgl.
White Crappie	250,000 Fgl.
Brown Trout	20,000 Fgl.

Lewis and Clark Tailwaters

Musky	50,000 Fgl.
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South Dakota Missouri River Generalized Water Management Plan

Missouri River water manipulation is one of the major options available for fisheries, wildlife and recreational management in South Dakota. Information gathered over the years has shown water levels and vegetation regrowth are critical to successful fish reproduction and recruitment on these large reservoirs. Research also indicates that the timing and amount of released water are limiting factors for least tern and piping plover populations. A system-wide approach to water management is supported by South Dakota.

Water level scenarios for each of South Dakota's mainstem reservoirs are somewhat different. General plans are, therefore, presented by reservoir and tailwater reaches. These plans also reflect water level management that is compatible with park use and tern/plover habitat needs.

The following general plans are unique to each respective reservoir and tailwaters:

Lake Oahe

The nature of Oahe Reservoir allows several water management cycles, those being: seasonal, annual, and over several years. A general request over years would allow for a two year period of water levels that do not exceed the base of flood control. This allows a minimum of two growing seasons for shoreline vegetation re-growth. Following the low period, reservoir elevations would be allowed to inundate re-vegetated shoreline in annual increments; thus, utilizing the vegetation over several years rather than all in one year. Fish reproduction and recruitment have been excellent when reservoir elevations follow that general cycle over years.

Annually, water levels should rise from early spring until summer, be held stable for the summer, and then be allowed to decrease gradually during late summer and fall. This scheme should begin with elevation about 1,605 ft in early spring.

Water may be manipulated seasonally by allowing a faster or slower rise in the spring and hold or release water in other reservoirs. This could be used to maximize benefits of shoreline vegetation, water temperatures or the chronology of spawning fish. For example, species could benefit by designing water levels for the appropriate spawning time related to vegetative conditions. Vegetation re-growth could be utilized over more than one spawning season thus benefiting fish production over a series of years.

Sandbars, silt flats and islands exposed on Lake Oahe during the initial years of recommended drawdowns should provide relatively secure nesting habitat for terns and plovers as was evidenced in 1982. The scenario of drawdown, vegetative re-growth, flooding and drawdown will likely benefit terns and plovers as well as northern pike.

Extremes to avoid on Oahe Reservoir would be: elevations below 1600-1602 ft which makes boat ramps unusable; elevations above 1617 ft which causes great amounts of shoreline erosion; and decreasing water levels during spring spawning.

Oahe Tailwaters

Tailwater releases should not drop below 10,000 cfs on weekends during April through September. This would enhance use by the public and stabilize aquatic habitat in the river from the dam to the upper end of Lake Sharpe and potentially prevent ice jams during the winter.

The aquatic habitat is diminished in the river below Oahe Dam when low flows exist. This displaces fish and other aquatic animals and thus impacts the stability of the aquatic community in this valuable river reach.

Stable releases are needed during spring spawning and fishing season. High releases are needed during periods of high turbid flows from the Bad River to flush sediment downstream. Watershed management should be planned in the Bad River drainage to minimize sediment loads from the Bad River.

Any dredging activities in this area should be designed to build artificial nesting structures for terns and plovers. Efforts could be made to concentrate dredge spoils which have been used by both species as nesting habitat in other states.

We need to study the problems associated with winter ice jams and reduced flows from Oahe. The larger question of aggradation should be addressed and the impact that it has had and will have on future flows during all times of the year should be defined. The Pierre/Ft. Pierre study has addressed the question of ice damming from a power production viewpoint. The problem needs to be viewed from a biological/recreational viewpoint as well.

Lake Sharpe

Due to the usual stable operation of Lake Sharpe, the current Corps of Engineers operating plans for that reservoir meet fisheries needs. The sport fishery in Lake Sharpe appears to be the most stable walleye fishery of the four reservoirs because of water management of the reservoir.

Weekend elevation fluctuations greater than 2 feet should be avoided. This affects access at Farm Island and West Bend. Lake elevation should be held greater than 1419.5 ft.

Big Bend Dam Tailwaters

An instantaneous release of 10,000 cfs is needed to stabilize fishing over the weekend and minimize effects of fluctuating water levels on fish. As with the Oahe tailwaters area, any dredging activities could be used to create artificial nesting habitat for terns and plovers. Historic data indicates this area was used during the 1970's by nesting least terns.

Releases of 10,000 cfs or greater are recommended unless make up water from the emergency spillway produces a 10,000 cfs minimum.

Lake Francis Case

Stable to rising water elevations from mid-April to mid-June when fish spawning is mostly complete. Shoreline vegetation is in short supply on Lake Francis Case and two growing seasons are necessary to produce good re-growth that will be useable by spawning fish. Normal fall drawdown severely limits littoral zone production of bottom organisms, which are important fish food items. Any reduction in the amount of fall drawdown would benefit benthic production and in turn provide a boost to the fishery.

Any decrease in water elevation from mid-April through mid-June should be avoided. The relation of reservoir volume to Ft. Randall releases means small changes in inflows or outflows may cause significant elevation changes during prime spawning times. Elevations greater than 1360 ft will cause damage to boat ramps, park facilities, fisheries facilities and increase shoreline erosion. Elevations below 1353 ft during the recreational season of Memorial Day to Labor Day are undesirable. Elevations less than 1345 ft makes most boat ramps unusable.

Fort Randall Tailwaters

The traditional request for stable releases of 20,000 cfs were requested for Fort Randall Dam. This allowed adequate flows to provide suitable spawning habitat in the river to Lewis and Clark Lake. Riverbed degradation and sandbar movements have decreased the effect of 20,000 cfs flows on the spawning habitat. Spawning substrate is at an elevation that requires 25,000 cfs to inundate suitable spawning habitat. These releases should be maintained into June.

Sport fishing is enhanced by flows greater than 20,000 cfs by providing good access to the river, stable flows, and minimized effects resulting from peaking. Low angler use, for example, was documented during 1984 through 1986 due to extremely low releases from Fort Randall Dam during the spring.

Of special concern in this region and the Gavins Point tailwaters section are the high concentrations of nesting terns and plovers. Releases should be coordinated to concentrate birds on suitable habitat and maintain safe habitat during the critical June and July portions of their nesting season. High water releases (35,000 cfs or higher) during the fall or winter could be used to scour existing sandbars thereby removing vegetation in addition to creating high profile sandbars. Water level management that would facilitate least tern production should be appropriate for fisheries needs as well. Flows less than 20,000 cfs during the spring period and flows less than 10,000 cfs the remainder of the year should be avoided. Water could be released from spillway to supplement flows during plant inspections. In-stream flow studies are needed to address critical life stages and associated habitat needs of existing fish populations.

Lewis and Clark Lake

Due to physical characteristics of Lewis and Clark Lake, little shoreline or aquatic vegetation exists. The few small bays that occur have been closed to the reservoir by wave and sediment action. The reservoir should be held slightly higher in the spring and slightly lower in the summer and fall so that a more normal lake-like pool is maintained through the entire year and avoid winter

drawdown to 1,204 ft. Reclamation of bays should be planned to increase shoreline development and provide additional habitat.

Elevations of 1208 ft or greater should be avoided because of extreme shoreline erosion that occurs. Shoreline damage occurs along the parks and causes damage to development areas. Shoreline vegetation would aid spawning and nursery areas.

Gavins Point Tailwaters/Lower Missouri River

The natural river portion from Gavins Point Dam to Ponca, Nebraska, harbors critically important nesting habitat for terns and plovers. We strongly suggest that a coordinated plan be developed to provide safe nesting habitat, protection from human disturbance and continued funding for needed research concerning interior least terns and piping plovers. The suggestions for the Fort Randall tailwaters would also apply to the section below Gavins Point Dam. Releases from Gavins Point traditionally are stable and we support that operating plan. We do question the need for annual de-watering for inspection because of its effect on attached organisms. If other inspection methods such as the use of divers or cameras are available, we would support that rather than de-watering. We appreciate the 1985 inspection method of maintaining adequate flows by releasing water from the spillway.

Prepared & revised by
Dennis Unkenholz
March 21, 1988

From DRAFT thesis
prepared by Monica Schwalbach
SDSU Coop Unit
Brookings, SD

CONCLUSIONS AND MANAGEMENT RECOMMENDATIONS

The following conclusions and recommendations for protection, management, and continued study of interior least terns and piping plovers in SD are based on the 1986 and 1987 tern and plover surveys, previous surveys, published and unpublished literature, and professional judgement. Due to the highly different water conditions between 1986 and 1987 on the mainstem Missouri, conclusive statements about some of my objectives could not be made. These conclusions should therefore be considered tentative until further information is obtained which can be compared to water and habitat conditions of 1986 or 1987.

In general, a water management strategy which allows for the earliest possible nesting and subsequent early

fledging of least terns and piping plovers is recommended. River stages below mainstem dams should be maintained at low, constant levels throughout the mid May to August nesting and brood rearing season, and major fluctuations in water levels during that period should be avoided. With early production, water releases could possibly be increased earlier in the summer when barge, marina, and other river consumer needs are more demanding because of low tributary inflows. Concurrent with this water management strategy, intensive nesting site protection would reduce the impacts of human disturbance which often result in renesting, hence later fledging by terns and plovers.

The key to protecting least terns and piping plovers is to determine the location of nesting areas and to protect, maintain, or restore this existing habitat accordingly. Since water level fluctuations affect habitat availability, habitat quality and species distribution, surveys are necessary to identify new nesting areas, confirm use of old nesting areas, monitor productivity and protect nesting sites. Until the populations of terns and plovers recover to the extent appropriate for delisting as threatened or endangered, these surveys will need to be continued on an annual basis.

Although no least terns or piping plovers were found nesting along the tailrace areas downstream of Oahe or Big Bend dams, nesting could occur there if pool elevations are reduced and habitat conditions improve. Therefore, it is desirable to continue surveys along these areas at least semi-annually. Additionally, since no least terns or piping plovers were found along the Grand, Moreau, or White rivers, annual surveys on those rivers are probably not warranted more frequently than once every 3 to 5 years.

The greatest concentrations of nesting least terns and piping plovers occurred on the Gavins Point river reach, where approximately 65% of the least terns and 90% of the piping plovers nested. Fewer least terns and piping plovers nested on the Fort Randall river reach, where the number of sites available for nesting was less. Oahe Reservoir habitats supported the least numbers of nesting terns and plovers, and nesting colonies there were small compared to those on sandbars. Beaches are evidently less desirable than sandbars as nesting sites for terns and plovers along the mainstem Missouri in SD. While future research efforts should focus on terns and plovers nesting along the Gavins Point reach because of the larger concentration of birds there, the importance of the other river reaches should not be overlooked.

Turnover rates of least tern and piping plover colonies were lowest on the Gavins Point reach, which indicated that nesting sites there were the most stable between the two years. A reduction in turnover rates can be achieved by improving the conditions on nesting sites (e.g. reduced water levels during the nesting season, protection from human disturbance, etc.). When stable nesting sites are established, management efforts can focus on intensive protection, maintenance, or restoration of specific colony sites.

Reproduction was suppressed during 1986, a high water year, due to reduced habitat availability and suitability (i.e. low mean site elevations, reduced site size, and increased likelihood of water impacts). Along Oahe Reservoir, tern and plover production improved substantially from 1986 to 1987 because pool elevations were reduced earlier in 1987. The 1987 water levels below Gavins Point Dam were more conducive to least tern and piping plover production than the 1986 water levels. Least tern and piping plover production there improved dramatically from 1986 to 1987, due to an average summer discharge which was 5000 cfs (ca. 1.0 feet) less in 1987, and to water levels which were maintained at a fairly constant stage through the nesting season. In contrast, least tern and piping plover production was poor and water levels were not conducive to

production on the Fort Randall reach, both in 1986 and 1987. There, sporadic fluctuations during both nesting seasons caused inundation of nests, considerable renesting, and site abandonment.

Water discharge plans at all SD mainstem dams should include provisions for tern and plover production until all agency goals for their protection and a sustainable level of tern and plover production are met. Based on expected water inputs and system storage the COE should set target summer stages (and accompanying discharge rates) for water levels below each dam, prior to the nesting season. Discharges should then be adjusted so that the target stage is reached by the beginning of the tern and plover nesting season (20 May at the latest). River stages should be maintained at low, constant levels throughout the mid May to August nesting and brood-rearing season. Daily and weekly fluctuations during the critical nesting period should be avoided. Stages can be adjusted later during the season (if necessary) by coordinating water level management with field surveys of nest elevations and adjusting flow rates as water conditions dictate. To reduce possible impacts of wave action on nests, a minimum of 0.5 feet elevation should be maintained as a buffer zone between the lowest active nests and water levels.

The release schedule recommended to the COE by the Nebraska Game and Parks Commission (1985) provides an example of how releases can be managed under years of different water conditions. However, since riverbed degradation below the mainstem dams continually causes a reduction in the relative water elevations and correspondingly alters the water level changes produced by differing releases, specific discharge recommendations would be of limited value. Much could be gained by evaluating the amount and quality of habitat available at different discharge rates, and summer releases could more appropriately be determined with the use of this information. By combining information on system and tributary inflows, flood control requirements, and field surveys of conditions at the nesting sites, water levels could possibly be managed with greater flexibility, and thereby accommodate other river consumer needs in conjunction with endangered species production.

Should downstream flooding during the nesting season necessitate a reduction in water releases from the mainstem dams, water levels will have to be managed to discourage terns and plovers from nesting on the newly exposed habitat. If not, a return to target water levels would inundate the new nests. River stage modeling can be combined with data on downstream tributary inflows and tern and plover nesting

information to determine appropriate release times and amounts. Observations made during the 1986 and 1987 nesting seasons indicate that terns and plovers will select nest sites at higher elevations if such sites are available on suitable nesting habitat. Also, terns and plovers will spend several days preparing nest cups before egg-laying. Therefore, short-term reductions in water releases should not be of great concern. However, if it is necessary to reduce releases for greater than 3 to 4 days, periodic increases of flows to target levels would serve to discourage nesting attempts at lower elevations.

Plans for enhancement of tern and plover production and populations by providing alternate or improved nesting areas should be made. Due to the vast differences in water conditions between 1986 and 1987, specific values for optimum site characteristics have not been delineated. Nonetheless, habitat enhancement plans should include consideration of (1) nesting area size, abundance and distribution, (2) nest to water distances, and (3) nest elevations above water levels. During normal and low flow years maximization of these attributes should be readily attained using well planned water releases. Nesting areas with optimum site conditions may then serve as nesting refuges during high water years.

Future research should include an evaluation of methods to remove vegetation from sites that are currently unsuitable for nesting and some subsequent monitoring of these manipulated areas for bird use. Devegetation of sandbars or islands by mechanical means (i.e. discing, burning) may prove valuable in restoration of nesting areas, and should be studied in further detail. New investigations should also include testing the possibility of scouring vegetation off potential nesting sites by periodically inundating them during the non-production season and then exposing them by lowering water levels during the mid May to August nesting and brood-rearing seasons.

Recreational activity is an important factor affecting the productivity of least terns and piping plovers along the mainstem Missouri River in SD. A system of active nest site protection should be developed, implemented, and maintained until population goals are reached and assured. Posters describing each species, the reason for protection, and individual personal and agency responsibilities, should be placed at each boat ramp located within 5 miles of each nesting colony. Additional warning signs should be placed at colony sites known or suspected to have frequent human disturbances. Patrols by authorized enforcement personnel should be performed periodically at each known colony. Additional enforcement attention may also be necessary

during holidays and weekends at sites known to attract recreationists. An information and education program should be coordinated between state and federal agencies with a responsibility toward protection of least terns and piping plovers along the mainstem Missouri River.

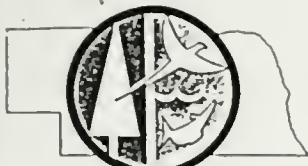
Compared with the potential impacts of water levels and recreational activity, predation and weather are not presently considered the most important factors limiting the production of least terns and piping plovers along the mainstem Missouri River but their importance may increase in rank during any one year.

Future studies should be designed to build on baseline data gathered in this study in order to gain a better understanding of tern and plover populations with the purpose of refining management plans for protection of these endangered and threatened species in SD. Suggestions for further studies include the following, which are listed in no certain order of preference:

- 1) Determination of the quality and quantity of habitat available at different river stages.
- 2) Determination of the temporal changes in the quality and quantity of nesting habitat.
- 3) Determination of the long term effects of Missouri

River aggradation and degradation on tern and plover nesting habitat.

- 4) Evaluation of how alternative nesting areas benefit species abundance and production.
- 5) Assessment of food availability as a potential factor limiting tern and plover distribution and production.
- 6) Assessment of site protection as a strategy to improve tern and plover site tenacity and production. /
- 7) Development of a model for determining accurate water elevations at given locations at specific discharge rates for the entire mainstem Missouri River.



Nebraska Game and Parks Commission

2200 North 33rd Street / P.O. Box 30370 / Lincoln, Nebraska 68503

September 12, 1988



B. G. Robert H. Ryan
P.O. Box 103
Downtown Station
Omaha, Nebraska 68101-0103

Dear General Ryan:

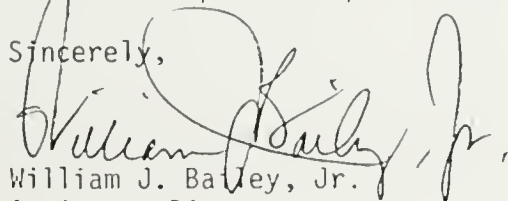
The Nebraska Game and Parks Commission is vitally interested and concerned about the impact that current C.O.E. operations will have on fishery resources of the Missouri River.

To be more specific, the release of extra water (approx. 5,000 cfs+) out of the mainstem reservoirs now to support navigation in the Mississippi River and then dropping the flow after November 15, 1988 to a 10-12,000 cfs range would seem to result in dewatering of wetland backwaters below Ft. Randall and Gavins Point Dam this winter. Then next spring (1989), if these same backwaters are dewatered due to peaking at Ft. Randall the unchannelized reaches of the Missouri River would continue to be adversely affected. Obviously, the aquatic habitats and associated fishery resources are difficult if not impossible to manage for under these circumstances. We are continuing to study the impact of low regimes on fishery resources and have a few recommendations we would like to share with you regarding water management from Ft. Randall downstream. They include:

1. Targeting an absolute minimum instream flow of 15,000 cfs until additional data provide further insight into a more suitable flow regime.
2. Targeting stable or rising instream flows below Ft. Randall Dam in late winter and early spring extending to June 30th.
3. Targeting the least amount of peaking possible at Ft. Randall from May 1 until after June 30th.
4. Targeting spring flows from Ft. Randall Dam as precipitation and snow melt dictate, but timed with the natural cycle of precipitation and run-off.

The Nebraska Game and Parks Commission appreciates the opportunity to comment on your annual operation plan. Attached is a brief assessment of water management in relation to the fishery in 1988 for your consideration and use in the annual operation plan for next year.

Sincerely,


William J. Bailey, Jr.
Assistant Director

WJB/GZ/dw

89

✓ cc: Kent Keenlyne

Nebraska's Contribution to COE-AOP.

Tentative assessment of the effect of water management on fisheries during the period March through August 1988.

1. River segment between Nebraska-South Dakota border and Gavins Point Dam.

Nebraska Game and Parks has collected data on larval fish density as well as completed electrofishing, gillnet, hoopnet, and seine surveys for juvenile and adult fish during 1988. In addition we will eventually have the gage data needed to establish the actual condition of this water year. These data will not be summarized and a report prepared until February of 1989. At that time the 1988 water year will be placed into perspective with the previous 5 years. We believe, however, that 1988 will stand out as a relatively good reproductive year for native spring spawning fish species. The University of South Dakota, Vermillion completed extensive trawl and seine surveys in Lewis and Clark Lake during 1988. Dr. James Schmulbach, project leader, concurs that preliminary observations would suggest that reproduction was improved over previous years for paddlefish and sauger/walleye.

We believe that improved reproduction and survival, if it is shown to have occurred, resulted from the onset of warm weather in early spring 1988 which facilitated early return to normal summer river elevations. In addition relatively stable spring and summer discharges, from Fort Randall Dam, a result of basin wide drought conditions, eliminated the threat of flood control actions

which in previous years caused a cessation of flows from Fort Randall Dam and severe dewatering of critical spawning habitat.

2. River segment between Gavins Point Dam tailwater and Rulo, NE.

Nebraska Game and Parks has acquired survey data from this reach in addition to the unchannelized survey data. We must wait until gage data for 1988 is available to correlate with biological data acquired in 1988. We believe, however that adult fish survey information will clearly identify a long-term trend of declining fish stocks along the channelized river, which is a function of deteriorated spawning conditions (both habitat and water levels), reduced availability of organic matter and nutrients, impaired migratory behavior, and overfishing of depleted stocks.

Nebraska Game and Parks research reports, and University of South Dakota graduate studies reports will be available to help clarify these comments early in 1989.

Chairman's Report

Larry Peterman, MDFWP

The MRNRC has the potential to become an effective voice in natural resource issues in the Missouri River Basin. We are becoming recognized by various groups in the basin and have been represented at and invited to several major conferences, including the Missouri Basin States Association symposium in Council Bluffs, Iowa, and the Northern Lights Symposium in Billings, Montana.

The MRNRC charter was finalized this past year and ratified by all seven states. The summer meeting in Helena demonstrated that the commitment exists by all the members to make MRNRC a viable and workable organization. It was noteworthy that all of the member states were able to make the special effort necessary to attend the summer meeting. The discussions were relevant and timely, and we found there were more than enough issues for a two-day meeting. The summer meeting provides the opportunity to more fully appreciate each other's resources and problems and discuss common issues and goals. I am certainly looking forward to the next one.

MRNRC got off to a good start in 1988, but we all recognize that it was just a start. There is much to do in the coming year to make the organization more effective and responsive, and there are significant resource issues that need to be addressed.

We need to pursue a funding mechanism to allow the member states to participate in MRNRC meetings as well as other conferences and symposia in the basin. The pallid sturgeon will require considerable effort for many years to come. There are other species that need attention as well. Reservoir operations is an area where considerable progress has been made in recent years, and a good working relationship has been established between us and the Corps of Engineers. We need to work hard to maintain that relationship. There is potential for cooperative studies between various states that need to be identified and initiated. Mitigation debts still remain that may best be addressed in a cooperative fashion. The list could go on.

I am confident that, through our combined efforts, we can effectively meet the challenges ahead. I look forward to working with MRNRC in the coming years.

Coordinator's Report

The 1988 water year marks a year of renewed consideration about the importance of the Missouri River from one end of the basin to the other. Yields from the upper end were as low or lower than any previously recorded figures, and reservoir storage dropped to the lowest levels since first becoming fully operational over 20 years ago. Sixty days or more of 90 degree plus days were seen over much of the Plains area as irrigation and power demands rocketed. Similar low yield was also observed in the upper Mississippi drainage which pressured the system for releases to support downstream users. By late summer, flows from the Missouri constituted about 70 percent of the Mississippi River flows at St. Louis, and demands were being made to increase releases from the reservoir system to further support navigation. The ensuing controversy shocked the downstream user into thinking about the importance of the Missouri and the storage system on the upper river and assured that, in the future, downstream interests would take a much keener view of how water is being managed on the upper system.

For the Committee, this marked a year of exploring avenues for more effective input into the operation of the system. To gain more equal consideration with other uses, generic (for lack of a better term) recommendations were made for fishery management purposes to be included in development of Annual Operating Plans in September. These long range recommendations removed the limitations of preparing recommendations based on what was offered for water in the spring by making fishery desires known at the same stage of planning as has been the norm for other uses.

Greater awareness also expanded about the importance of the river for recreation, municipal water supply, and rare fish and wildlife. How to manage habitat for federally listed terns and plovers while meeting the expectations of other users became an issue for discussion. Low winter flows to conserve water became a water quality and water supply issue as well as a fishery concern. A petition to list the pallid sturgeon became an item of great interest. The list of issues reflected the importance of the Committee as a means of exchanging ideas and working together to resolve potential problems and set in motion the crucial role that the Committee may play in the future of the river.

CONSTITUTION OF THE MISSOURI RIVER NATURAL RESOURCES COMMITTEE

The Missouri River Basin States, of these United States, establish this Constitution of the Missouri River Natural Resources Committee in order to promote and ensure the good stewardship of the Missouri River.

The following Articles of this Constitution shall describe, define, and delineate this organization by structure and function.

Article I - The name of the organization shall be the Missouri River Natural Resources Committee, hereinafter referred to as the Committee or the MRNRC.

Article II - The objectives and purposes of the Committee shall be:

1. To facilitate a systems approach to managing the natural resources of the Missouri River.
2. To promote preservation, wise utilization, and enhancement of the natural and recreational resources of the Missouri River.
3. To formulate policies, plans, and programs for carrying on cooperative research and management studies for the above-stated purposes.
4. To keep necessary records on consumptive and recreational use, and to publish and distribute reports.
5. To recommend to the governing state bodies activities and programs which further the Committee objectives.
6. To provide coordinated recommendations to appropriate agencies on the operation and maintenance of the Missouri River main stem management.
7. To make coordinated research and study proposals to appropriate management and approval agencies in furtherance of the Committee objectives.

Article III - Membership and Meetings

1. Membership

The membership of the Committee shall be the following classes:

- a. Official Members and Delegates - The official members (seven) shall be: (1) Montana Department of Fish, Wildlife and Parks; (2) North Dakota Game and Fish Department; (3) South Dakota Department of Game, Fish and Parks; (4) Nebraska Game and Parks Commission; (5) Iowa Department of Natural Resources; (6) Kansas Department of Wildlife and Parks; and (7) Missouri Department of Conservation. The appointed delegates shall constitute the Committee. Each official member shall be represented by a delegate appointed by the responsible administrator (director or commissioner) of the said agency. This delegate shall be a person having knowledge of and interest in the Missouri River resources and shall be a person of responsible administrative authority who can make decisions on behalf of his agency provided the same are not contradictory to its policies and do not exceed its financial limitations.
- b. Ex-Officio Members and Delegates - The U.S. Fish and Wildlife Service and the U.S. Army Corps of Engineers will serve as ex-officio members on the Committee. The ex-officio members shall appoint delegates as the Service Regional Directors or the Division Engineer deems appropriate. This delegate(s) shall be a person having knowledge of and interest in Missouri River resources. An ex-officio delegate can fully participate in Committee discussions but will not be an official voting member on Committee decisions.
- c. Cooperating Agencies - Other governmental agencies and private organizations interested in the resources of the Missouri River may serve as cooperating agencies with Committee approval. Such approved agencies may appoint members as they deem necessary and proper to aid the work of the Committee.

2. Meetings

- a. Regular - The Committee shall hold regular meetings at times and places determined by the Committee.
- b. Special - A special meeting may be called by the Chairman at the request of four or more official members.

Article IV - Offices and Committees

1. The officers of the MRNRC shall be the Chairman and the Chairman-Elect. The Chairman shall serve a one-year term. The Chairman-Elect shall also serve a one-year term, and succeed to the Chairmanship without further election. The Chairmanship and Chairman-Elect will be rotated in the following order: Iowa, Montana, Kansas, North Dakota, Missouri, South Dakota, and Nebraska. In the event of the resignation of an officer, that member (agency) represented shall appoint a replacement for the unexpired term. Only official delegates shall be eligible to serve as elected officers.
2. The U.S. Fish and Wildlife Service shall provide a Coordinator to the Committee.
3. Committees -
 - a. Official Committee - The Chairman, Chairman-Elect, and the official delegate from each state not represented by an officer shall constitute the Official Committee. Each state will have one vote (the state designee) on issues where a vote is required. The U.S. Army Corps of Engineers and the U.S. Fish and Wildlife Service may name ex-officio members to the Committee.
 - b. Standing Committees - The Committee shall have authority to establish Standing Committees to investigate an assigned subject and report at the regular meetings. New Standing Committees can be established by the Official Committee and existing Standing Committees disbanded if their work is deemed complete.
 - c. Ad Hoc Committees - The Chairman shall appoint Ad Hoc Committees for special assignments. An Ad Hoc Committee is a temporary committee with a short-term assignment. It shall be terminated upon presentation and acceptance of its report.

Article V - Procedures

1. Roberts Rules of Order shall be followed in all meetings.
2. Motions and seconds may be made by the official state delegate or his designee.
3. Each official member shall be entitled to only one vote.
4. The presence of five of the seven official members shall constitute a quorum, and four affirmative votes will be necessary to pass a motion. Proxy, mail ballot, or telephone vote will be permitted.

BYLAWS

1. Duties of Officers

- a. Chairman - The Chairman is responsible for the business of the MRNRC, makes appointments to any Ad Hoc Committees, and exercises such other functions as may be determined from time to time by action of the members. The Chairman shall provide for and shall preside at the annual meeting, at any special meetings, and at meetings of the Official Committee.
- b. Chairman-Elect - The Chairman-Elect shall assume the duties of the Chairman in the Chairman's absence or inability to act. The Chairman-Elect shall be prepared to take over the duties of the Chairmanship when becoming Chairman.
- c. Coordinator - The Coordinator answers to the Chairman, who speaks for the Committee. The Coordinator shall assist the Chairman in furthering the goals and objectives of the MRNRC, organizing the Committee's activities, and coordinating among member agencies of the Committee, other federal, state, and local agencies, and the public. The Coordinator shall also be required to perform specific tasks associated with the administration of the Committee, such as:
 - (1) Maintain the administrative record of all Committee activities.
 - (2) Manage the development of information and reference documents, with such responsibility to include oversight of all records, documents, and publications that are to be either prepared or adopted by the Committee.
 - (3) Supervise the development of coordinated natural resource plans.
 - (4) Prepare for publication the Proceedings of the Annual Meeting and other publications and publicity materials as the Committee may direct.
 - (5) Serve as the Chairman's representative at meetings and conferences, and at Ad Hoc Committee meetings, as appropriate.

2. Ex-Officio Agencies

Representatives of ex-officio agencies are encouraged to assist the Committee in coordinating activities and in supplying such services and information as may assist the Committee to achieve its objectives. Representatives of the ex-officio agencies may serve as members of Standing or Ad Hoc Committees, present reports, and participate in discussions at annual and special meetings.

3. Responsibilities of Committees

- a. Official Committee - The Official Committee of the MRNRC shall meet at least annually. Additional meetings may be called upon approval by representatives of the member states. Actions of such urgency that cannot be deferred until the next regularly scheduled meeting may be decided via conference call or emergency meeting. A full report of all such actions shall be included in the Chairman's report at the next annual meeting. The Official Committee may call on the coordinator and ex-officio member agencies for assistance.
- b. Ad Hoc Committees - Ad Hoc Committees shall be appointed by the Chairman as needed.

4. Order of Business -

The order of business at the annual meeting of the Committee shall include, but shall not necessarily be limited to, the following:

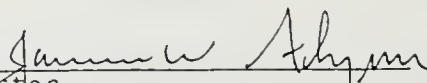
- a. Call to order by the Chairman.
- b. Roll call and determination that a quorum is present.
- c. Approval of minutes of the previous meeting.
- d. Report of Chairman on actions of Committee.
- e. Report of Coordinator.
- f. Reports of Standing Committees and recommendations to the Committee for later consideration.
- g. Reports of any Ad Hoc Committees.
- h. Old business.
- i. New business.
- j. Installation of newly-elected officers.
- k. Appointment of committees.
- l. Adjournment.

5. Amendments to Constitution and Bylaws

The Constitution and Bylaws may be amended at any annual or special meeting by unanimous vote of all official members.

MONTANA DEPARTMENT OF FISH, WILDLIFE AND PARKS

4-18-88
Date


Director

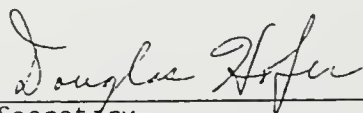
NORTH DAKOTA GAME AND FISH DEPARTMENT

9-19-88
Date


Commissioner

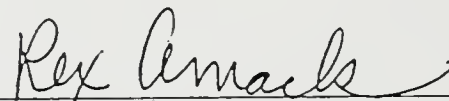
SOUTH DAKOTA DEPARTMENT OF GAME, FISH AND PARKS

5/31/88
Date

 for Dick Beringson
Secretary

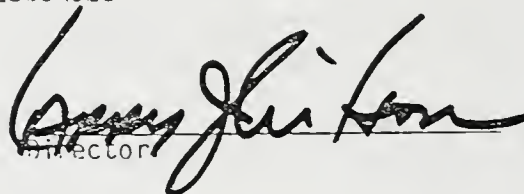
NEBRASKA GAME AND PARKS COMMISSION

Sept. 26, 1988
Date


Director

IOWA DEPARTMENT OF NATURAL RESOURCES

May 3, 1988
Date


Director

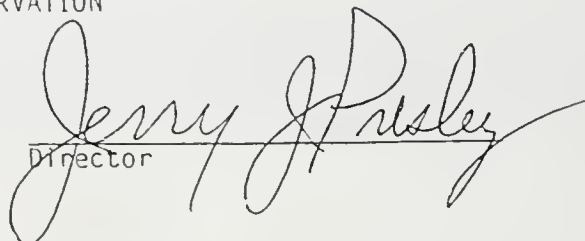
KANSAS DEPARTMENT OF WILDLIFE AND PARKS

10/16/88
Date


Secretary

MISSOURI DEPARTMENT OF CONSERVATION

10-17-88
Date


Director

